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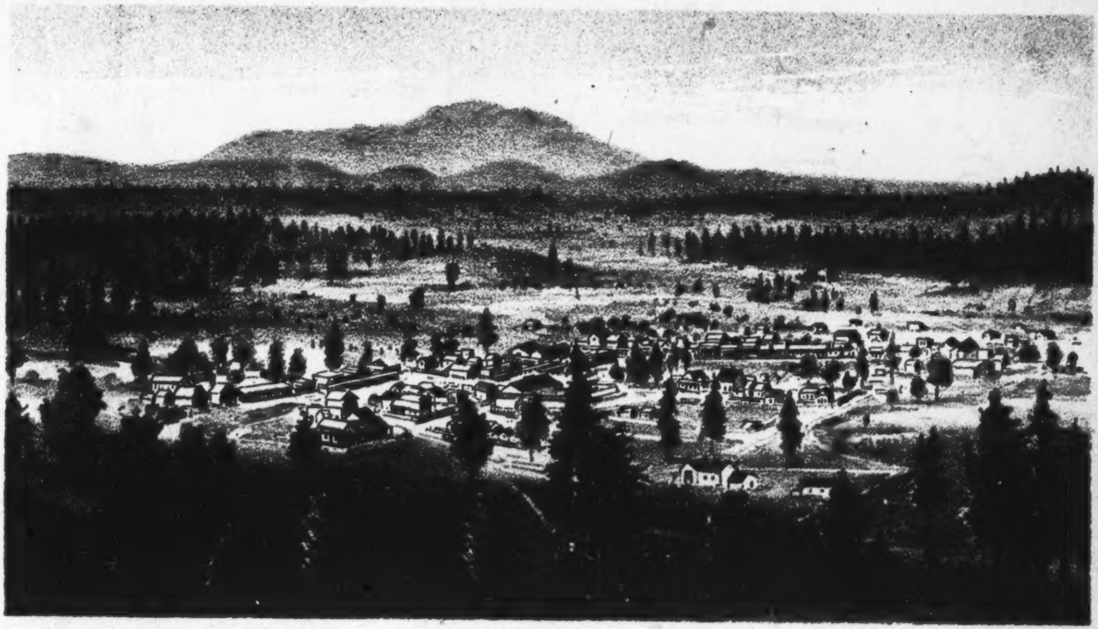
Hand-Book to Arizona.



LITH. BRITTON, REY & CO. S.F.

PRESCOTT
CAPITAL OF ARIZONA.

THE

HAND-BOOK

TO

ARIZONA:

ITS RESOURCES, HISTORY, TOWNS, MINES, RUINS AND SCENERY.

AMPLY ILLUSTRATED.

ACCOMPANIED WITH A

NEW MAP OF THE TERRITORY.

BY

RICHARD J. HINTON.

PAYOT, UPHAM & CO., SAN FRANCISCO.
AMERICAN NEWS CO., NEW YORK.
1878.

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PREFACE.

In presenting this work to the general public, and especially to the intending prospector, emigrant, traveler, and tourist, the author and editor can justly claim for it the merit of being the result of a careful and conscientious examination of all sources of information, verified by actual observation and examination. With an experience of twenty years in observing the growth of new territories and states, and some special knowledge and wide travel in connection with Arizona, conjoined with trained habits of noting and stating acquired as a journalist, the editor may fairly believe that he has been able to meet satisfactorily, in this volume, a growing want and public necessity. In this spirit he presents his work to all who are interested in the Territory and its development, as well as to all others who desire to learn what are the characteristics of this "marvelous country." In doing so, however, he does not claim that there are no errors or mistakes. Doubtless many will be found. He will be pleased to have all corrections forwarded to him, care of the *Evening Post*, San Francisco. But it is due to himself to say that such errors are far more the result of the carelessness and indifference of persons in Arizona from whom information was sought, than from the want of effort or foresight on the part of the editor. The map attached to this volume has been drawn on the basis of the official Land-Office map—a copy of which was kindly prepared and verified by the United States Surveyor-General, John Wason, Esq., of Tucson. The editor is indebted for valuable notes and corrections to George Tyng, editor of the *Yuma Sentinel;* to Mr. Bennett, mining engineer, Prescott; to C. E. McClintock, of the same place; and the Hon. C. D. Poston, U. S. Land Register at Florence. His thanks, and this public recognition of services rendered, are especially due to Alfred Cridge, Esq., of San Francisco, who has aided most effectually in the work of compilation. Without his patient accuracy, care, and assiduous verification of details, this volume would have lacked much of the value that is now claimed for it. The illustrations are chiefly drawn from photographs and original sketches, the district maps being made expressly for this volume. In addition to the map of the Territory, the reader will find a valuable Spanish map, now first lithographed, which gives an excellent idea of the extent of Spanish power at its date, one hundred years ago. The book is fairly launched, and believing it will meet a want, it is now left with hopes for success.

RICHARD J. HINTON.

TABLE OF CONTENTS.

CHAPTER I.

WHERE AND WHAT IS ARIZONA? 13

The Territory, Geographical Position, Area and Boundaries. When Organized. How to Get to It. From the East, via Kansas, Colorado and New Mexico, the Kansas Pacific, Atchison, Topeka and Santa Fé, and the Denver and Rio Grande Narrow-Gauge R. Rs. From the South, via the Indian Territory and Texas. From San Francisco, via the Southern Pacific R. R. A Marvel of Engineering. Southern California. The Mojave Desert. The Railroad Loop. Los Angeles. Santa Monica. Colorado Desert. How it Looks at Yuma.

CHAPTER II.

AN HISTORICAL SKETCH 27

The Spanish Exploration. American Pioneers. American Acquisition. The Gadsden Purchase. The Frontier Life. Without Civil Government. Filibusters. Crabb and Party. Abandonment during Civil War. Territorial Organization. Apache Outrages and Desolation. Sparse Settlements. The Civil War and its Effects. Legal Organization. Speech of Secretary McCormick. etc.

CHAPTER III.

PHYSICAL AND GEOLOGICAL FEATURES 46

The Topography of Arizona. Professors Blake and Pumpelly. Mountain Ranges. The Lava Field. Cones and Peaks. The Grand Plateau. Its Geology. Dr. Newberry's Word Painting. The Cañon System of the Colorado. Major Powell, the Explorer. Vivid Description. Navigation. The Gila, Colorado-Chiquito, etc. A Topographical Bond of Unity.

CHAPTER IV.

THE TERRITORY'S MINERAL RESOURCES 72

Sketch of the Silver Belt. From Cerbat Mountain to the Patagonia. Characteristics of the Ores and Lodes. Lead and Copper. A Variety of Minerals. The Coal Fields. Yavapai and Pima. A Copper Belt. Rich Placers. Fissure Veins. A Mineralogical Table. The Product of Arizona. Prof. Raymond and Mr. Valentine. Advantages for Capital and Coinage.

CHAPTER V.

MINES, MILLS, AND LOCATIONS 95

Description of Mines, etc., in the several Counties. Yavapai County: Comparison with Southern Arizona; Minerals and Districts near Prescott; Character of Ores; Locators; Towns and Mills; Copper Mines at Clifton; Coal; List of Locations in Yavapi County. Pima County; The Santa Cruz Valley; Old Mexican Works; Mining Districts; Copper, Galena, and Argentiferous Ores; Coal; Table of Mines in Pima County. Pinal and Maricopa Counties; Pioneer and Globe Districts; Mining Camps and Towns; Descriptions and Locations; Valuable Information; Silver King; Globe; Stonewall Jackson; Vulture Mine; Copper Lode; Table of Mines in Pinal and Maricopa Counties. Yuma County; First American Mining; Castle Dome; Weaver; Harcuvar; Cost of Labor and Living; List of Mines; Mojave County; Mountains; Settlements; Minerals and Mines; Table of Mines.

CHAPTER VI.

OVER VALLEY AND MESA 153

Leaving Yuma. A Picture to be Remembered. Up the Gila. Old Placers. Coronacion Mountain. Antelope. Oatman Flats. The Painted Rocks. Montezuma's Head. The Valley and its Agricultural Capacity. Pima Village. Florence. El Picacho. Tucson. The Landscape. Mirage on the Desert.

CHAPTER VII.

THE UPPER SANTA CRUZ VALLEY 182

The Sierra Santa Rita. A Grand Mountain Range. Sentinel Peak and Mount Wrightson from Tubac. The Old and the New Civilizations. An Old Presidio and its History. Bold and Romantic Scenery. Mineral Wealth. The Old Mission at Tumacacori. Jesuit Padres. Lost Mines Refound. Plancha de Platas. Aztec, Spaniard, Apache, and American. Opinions of Savants on its Mineral Wealth. The Cerro Colorado. The Sonoita Valley. Mill Sites. Hacienda del Santa Rita and Tyndall District. Toltec Camp and the Aztec District. Report of Prof. Davis. Geology and Mineralogy. Evidence of Experts. Placer Mines, East Side of Range. Roads, Timber, Grass, Climate. The Midnight Glory.

CHAPTER VIII.

THE SANTA CRUZ WEST TO PAPAGUERIA 213

San Xavier Del Bac; Revanton; Sopori; The Cerro Colorado; Arivaca; Cababi; Oro Blanco; The Papagueria; A Strange Region; Old Mines; Mexican Mines; Robbers; Copper and Silver; Lava Fields.

CHAPTER IX.

THE BABACOMORI AND EAST 231

East to Apache Pass. South from the Overland Road. The Cienaga. Camp Crittenden. Camp Wallen and the Babacomori Ranch. Camp Huachuca and Mountain. The Dragoon Spring Route. The Chiricahuas. The Arivaipa Cañon, etc.

CHAPTER X.

THE TOWNS OF ARIZONA 244

Historical Sketches of Yuma, Ehrenberg, Prescott, Florence, Tucson, Wickenburg, Phœnix. Their Population, Trade, and Surroundings. The Towns of Mojave County. Mining Camps. Mineral Park. Cerbat. New Virginia City. Signal, etc. A General Review. Wages. Cost of Living. Merchants. Importance, etc.

CHAPTER XI.

AGRICULTURAL RESOURCES.. 273

Area of Tillable Land. Arizona and South-eastern California compared. The Colorado. The Gila and Salt River. The Santa Cruz. The Minor Valleys. The Boundary Line and South-eastern Arizona. The Colorado-Chiquito. Southern and Eastern Yavapai. Mojave County. Mexican Grants. Irrigation.

CHAPTER XII.

MILITARY POSTS AND TELEGRAPH 308

Organization of the Department. Its Commander and Force. The Various Posts and their Surroundings. Apache. Bowie. Lowell. Huachuca. McDowell. Mojave. Thomas. Verde. Yuma. The Military Telegraph. Lieutenant Reade. Its Beneficial Results.

CHAPTER XIII.

CLIMATE.. 320

Physiological and Pathological Effects of Heat. Its Remedial Properties. Distinction between Dry Heat and Sultry Heat. Temperature at Various Places. Healthfulness in Changes of Temperature. Changes in Amount of Rainfall. Effect of Cultivation. Modus Operandi of Death from Thirst. Effect of Stimulants. Hot Springs and Saline Deposits.

CHAPTER XIV.

FAUNA AND FLORA OF ARIZONA.. 336

Mammalia. Birds. Reptiles. The Zones of Vegetation. Valuable and Abundant Forests. Strange Cacti. Invaluable Botanic Remedies. A Vegetable Soap. Apache Confectioneries. Tree Beans. The Scientific, the Curious, and the Useful.

CHAPTER XV.

THE INDIAN TRIBES.. 353

Their History and Peculiarities. Governor Safford's Account. The Yumas, Cocopahs, and Maricopas—Their Divisions and Wars. The Colorado River Reservation; Agricultural Habits and Capacity. The Pimas and Papagoes, Moquis, Apaches, Mojaves, and Yumas. Small Pah-Ute Bands Cultivating the Soil. Area of Reservations, Habits, Morality, etc. Homes of the Moquis, etc.

CHAPTER XVI.

MISCELLANEOUS 371

Railroads and Wagon Roads. The Various Lines of Transportation; Stage Routes; Cost of Travel. Freight East and West. Price of Labor; Skilled Mechanics. Population and its Growth. Taxation and Property Valuation. The Schools. Mexican Population. Semi-Oriental Habits and Appearance. Adobe Houses, Lakes, etc.

CHAPTER XVII.

THE SPANISH EXPLORERS AND MISSIONARIES................................ 384

The Spanish Discovery of Arizona. Friar Marco De Niza. The Negro Estevanico. Coronado. Castanada. Ulloa. Alarcon. Discovery of the Colorado. Espejo. Moqui and the Seven Cities of Cibola. The Pueblos. Fathers Kino and Escalante. Missions. Presidios. Pueblos, etc.

CHAPTER XVIII.

THE ANCIENT PEOPLE OF ARIZONA 396

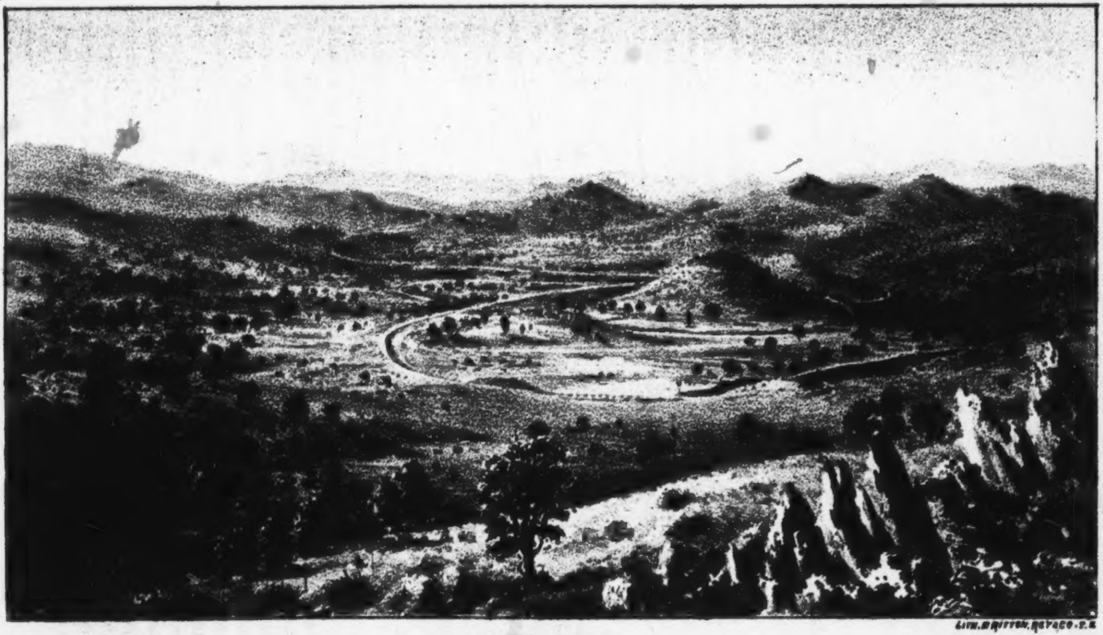
Who were the Ancient People—Toltec or Aztec? Different Theories—Humboldt, Gregg, Bell, Domenich, Prescott, Abbe de Brasbourg, Baldwin, Bancroft. Character of Architecture; Enclosed Houses; Communal Dwellings. Zunis. Moqui. Pueblo. Conclusions.

CHAPTER XIX.

THE ANCIENT RUINS, THEIR EXTENT AND CHARACTER 406

First European Discoveries. Castenada's "Red House." The Casa Grande, as seen by Fathers Kino, Mange, Sedelman, Font and Garcia. Mr. Bartlett's Visit. The Aztec Syndicate Party and the Ruins in 1877. The Salt River Mounds and Canals. What Hodge says. Emory's, Whipple's, and Johnston's Discoveries, The Ruins to the North. A Careful Summary. New Mexico and Colorado Ruins. Area Embraced. Cause of their Destruction. The "Coming Country."

APPENDIX..After page 432



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VIEW OF LOOP
TEHACHAPI PASS.
S.P.R.R.

CHAPTER I.

WHERE AND WHAT IS ARIZONA.

THE TERRITORY, GEOGRAPHICAL POSITION, AREA AND BOUNDARIES. WHEN ORGANIZED. HOW TO GET TO IT. FROM THE EAST, VIA KANSAS, COLORADO AND NEW MEXICO, THE KANSAS PACIFIC, ATCHISON, TOPEKA AND SANTA FÉ, AND THE DENVER AND RIO GRANDE NARROW-GAUGE R. RS. FROM THE SOUTH, VIA THE INDIAN TERRITORY AND TEXAS. FROM SAN FRANCISCO VIA THE SOUTHERN PACIFIC R. R. A MARVEL OF ENGINEERING. SOUTHERN CALIFORNIA. THE MOJAVE DESERT. THE RAILROAD LOOP. LOS ANGELES. SANTA MONICA. COLORADO DESERT. HOW IT LOOKS AT YUMA.

The Territory of Arizona lies in part between the Rocky Mountains and the Sierra Nevada, and is bounded by New Mexico on the east, Utah on the north in part, by Nevada on the north and west in part, and by the southern portion of California for the balance of the western line. The northern line of the Mexican Republic constitutes the southern boundary of this territory. It extends from 109 degs. to 114 degs. 25 min. west longitude, (Greenwich) and from 31 degs. 37 min. to 37 degs. north latitude, is therefore about 325 miles wide in both directions, and contains an estimated area of 113,916 square miles, or 72,906,240 acres, thus varying but very little from the united area of New York, Pennsylvania, New Jersey, Maryland, and Delaware, which together contain over one-third of the wealth and more than that of the total population of this Union. As part of the Union the area embraced by this territory was first acquired from Mexico, of which it had formed a portion for at least the three centuries and more which the Spaniards and their American descendants have ruled that country, and was acquired by the treaties of February 2, 1848, and of December 30, 1853. Under the former, the region south of the 32d parallel, or the Gila River, was not included. Under the treaty known as that of Guadaloupe-Hidalgo, all the territory (except the Gadsden Purchase, so-called) now embraced by New Mexico and Arizona, with a considerable area that has since been added to Colorado, Utah, and Nevada, was ceded to the United

States. Arizona was, until 1863, a part of New Mexico. By the act of February 24, in that year, it was made a separate territory. Its area then embraced 126,141 square miles. By act of February 24, 1866, the territory that now forms the southwest corner of Nevada, and which lies west of the mouth of the Grand Cañon, and to the north and west of the Black Boulder, Virgin and Iceberg Cañons of the Rio Colorado, was added to the area of the "Sage Brush State." It contains 12,225 square miles, and reduced Arizona to the area now embraced. Before its separate territorial organization, the only really American settlements within the present lines were some mining camps on the western edge of Mojave county, in the Hualupais, Peacock, and Cerbat Mountains. In addition to these were a few Americans, chiefly mining managers, engineers, and employés, who, from 1858 to about 1861, and again in 1863-4, were "hanging on to the edge" of things in and about Tucson and Tubac. All else, and there was little else outside of officials and troops, were Mexicans and Indians. This population was variously estimated at from 9,000 to 15,000 souls. The present population more than doubles the latter figures and increases rapidly. For governmental purposes, Arizona forms one custom district, and as to internal revenue, is under the control of the officer stationed in California. It constitutes two districts of the General Land Office, with headquarters at Florence and Prescott, the Surveyor-General being resident at Tucson. For military purposes, Arizona constitutes a military department, with headquarters at Fort Whipple, near Prescott, the territorial capital. A portion of Southern California is embraced by the department lines, and the whole forms part of the Division of the Pacific, now under command of Major-General McDowell. Brevet Major-General A. V. Kautz, Colonel of Infantry, is Department Commander. The Territory contains ten military posts, (nine of them being permanent) which are garrisoned by a force not exceeding 1,200 in all. Its proximity to the northern line of Mexico makes the military position one of great possible importance; while, until recently, the relations of the Indians were sufficiently hostile to make the service both laborious and dangerous. The Territory, at this writing, has no railroad beyond the amount of track at Yuma, sufficient to supply depot necessities to the Southern Pacific Railroad; is traversed by a tolerably complete line of military telegraph, under the charge of an acting signal officer, Lieutenant Philip Reade, connecting all the military posts, except Camp Mojave, on the Colorado, and Camp Huacachu, near the

Sonora line, as well as the towns of Yuma, Prescott, Phœnix, Florence, Tucson, and Tres Almamos, with the wires of the Western Union Company at Yuma and San Diego on the west, and Silver City and Santa Fé on the east, and at Mesilla, New Mexico, with the wires for Texas and the South generally. There are six Indian agencies in the Territory.

In order to reach Arizona, the traveller or emigrant from the States east of the Mississippi River, or from those south of the Ohio and Potomac, have their choice of an all-rail journey to Yuma, on the Colorado, by way of the Union and Central Pacific Railroads from Omaha to San Francisco, and thence south by the California Southern Pacific; or, on reaching St. Louis, Kansas City, Leavenworth, or Atchison, on the Missouri River, the intending traveller can take either the Kansas Pacific, or the Atchison, Topeka and Santa Fé Railroad. The first named route passes through the central portion of that lovely prairie State of Kansas, up the valley of the Kansas River to Junction City, near Fort Riley, whence it continues directly west along the valley of the Smoky Hill, one of the forks of the Kansas. The journey is interesting, and, as a rule, quite pleasant. The vast plains over which the road passes after leaving Junction City, were once the chief buffalo range of the continent. They are fast becoming the most valuable of stock ranges. On the western line of Kansas, the road diverges to the northwest, and terminates at Denver City.* The Atchison, Topeka and Santa Fé Road crosses Kansas, in a general direction, from northeast to southwest, until it strikes the upper Arkansas Valley near the Colorado line, when it goes directly west to Cañon City. At Pueblo the Arizona-bound traveller takes the narrow-gauge road. From that point the cars are taken on the Denver and Rio Grande Narrow-gauge Road, which lands the passenger at the point of construction furthest south at the time of the journey. This road passes along the eastern base of the Rocky Mountains, and through some of the most magnificent scenery on the continent, taking in Colorado Springs, Manitou, (or the "Garden of God") Pike's Peak, the South Park, and debouching into that of San Luis. At Pueblo, the Atchison, Topeka and Santa Fé Road forms a junction therewith, and crosses, terminating temporarily at Cañon City. The narrow-gauge road proceeds south, in a direct line, for about thirty miles, and then branches, one fork going south by east for twenty-five miles further to Trinidad, near the New Mexican line, and the other in a southwest direction for the same distance to Fort Garland, where a railroad town of the same name has sprung up. The road is pushing its way through the San Luis Park to the San Juan Valley and Mountains, a region already famous for its silver lodes and mines, and full of interest to the student and archeologist, on account of the abundant ruins still found as evidences of the existence of a race once numerous, industrious, and in some respects considerably advanced in a utilitarian civilization. This branch of the D. & R. G. N. G. road, if pushed, will enter, at no distant day, the northwest section of Arizona, and traversing south by west the Colorado and Mogollon plateaus, will open up a section of the territory not only rich in mineral wealth, but also well suited for settlement by stock and sheep raisers. It is the general course to be pursued in reaching the Gila Valley of the Santa Cruz, en route for Guaymas, on the Gulf of California. Debarking at Trinidad, the traveler will take the mail stages for Silver City, New Mexico, passing down the valley of the Rio Grande, through Santa Fé and Albuquerque; thence by the coaches of the Southern Overland Stage Co. to Tucson, Florence, Yuma, Prescott, and other Arizona points. From the Southern States, the travelers who do not object to a long stage ride, or intend providing teams for themselves and taking the old-fashioned plan of the emigrant "movers" in "camping out," will travel by the Texas Pacific road, leaving it at the furthest western termini, and there take the overland stages for Mesilla, Tucson, via El Paso, or outfit themselves for the slower, but perhaps more comfortable journey by wagon, or "burro" back. All of these routes involve a long and fatiguing stage and land journey, the shortest being at least 800 miles to Tucson; while they are not an undesirable preparation for the fatigues, etc., incidental to a frontier life.

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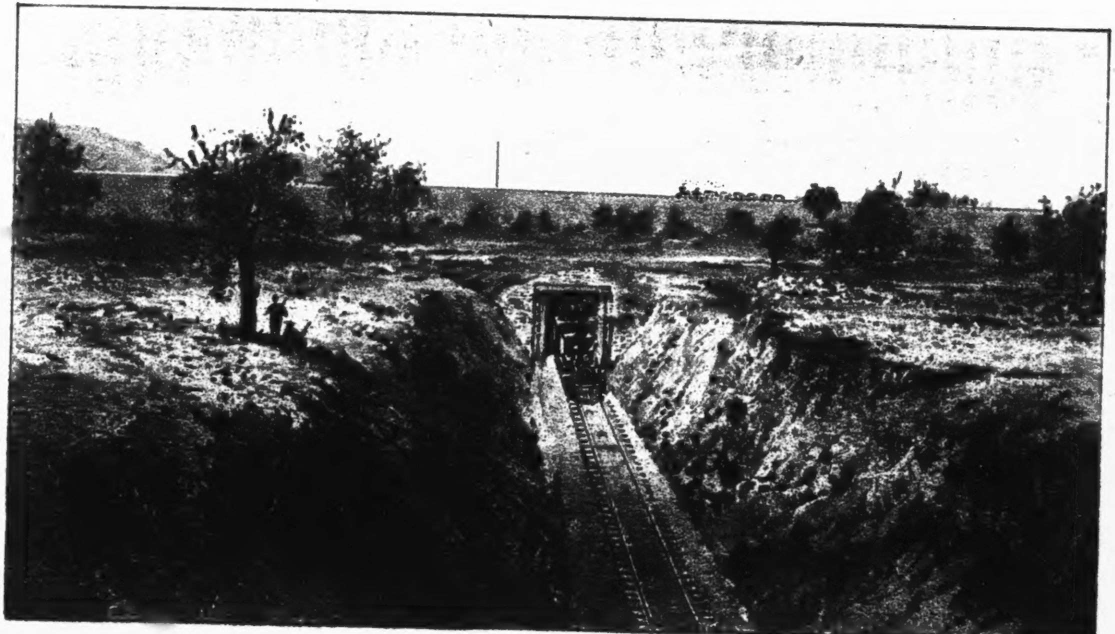
*For fares, distances on this and other lines, see Appendix.

The route most likely to be preferred is that by rail to Yuma, via San Francisco. It involves from the Atlantic cities a journey of seven days in Pullman cars, and with all the luxuries of the continental routes. Landed in the Golden City by the Pacific Sea, some days can be profitably spent in sight-seeing. To an American fresh from the Atlantic States, with his eyes open, but unaccustomed to California, San Francisco will leave for a first impression a sense of strangeness quite novel. The peculiar atmospheric tone and coloring is a large factor in this feeling, but the cosmopolitan character of the population—truly a congress of the common peoples from all parts of the



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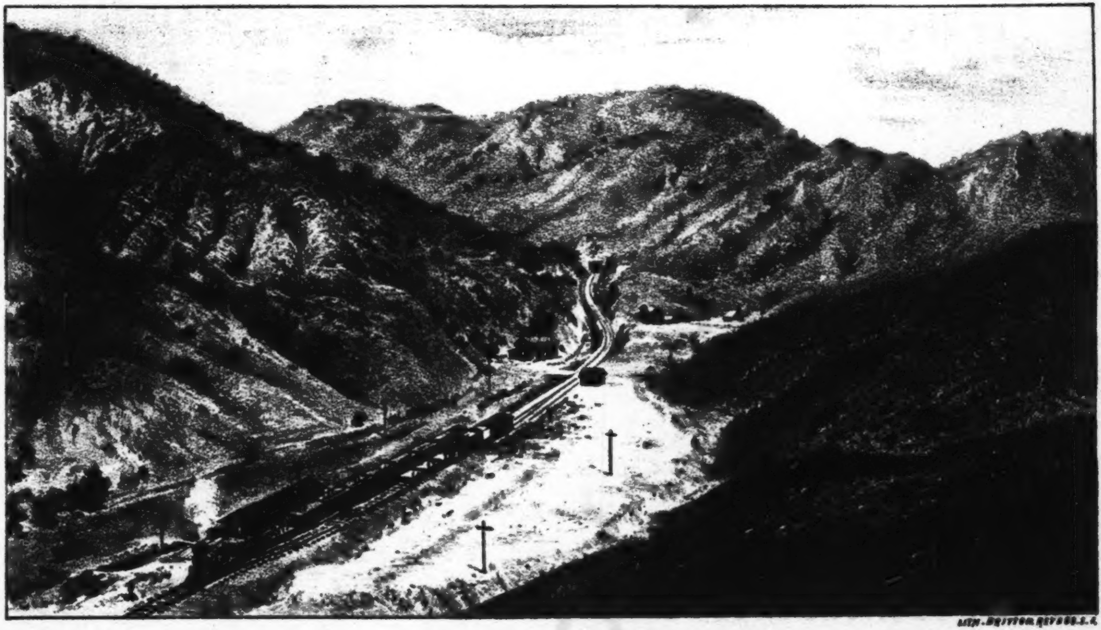
LOOP LINE
Tehachapi Pass

earth; the variety of tongues spoken, the new yet strangely old aspect of everything, the exceeding picturesque beauty of the environment, the peculiar climatic characteristics, with that inspiring freshness which daily comes to strengthen the overwearied worker: these things, and many customs and habits which those who live in the city have become so familar with that the novelty has departed, affect the traveler with distinct clearness and interest. The presence of Mongolian "John" does not detract from the strangeness of these early impressions, and until one becomes "habited" so to speak, the feeling is that of being in some other than an American city, though it be one dominated and controlled by the American life and activities. The southern route tends more strongly to fasten these impressions. The journey of 720 miles to Yuma is no longer to be dreaded. You get into your comfortable palace car, and in a little over forty hours find yourself panting in Yuma. The road passes through a great variety of scenery and climate. You cross ranges of mountains many thousand feet high, and then soon after you go thundering down the Colorado Desert hundreds of feet below the sea level. From charming suburban villages and fruit-laden orchards, you roll across the vast level wheat fields of the great San Joaquin Valley, speeding by places known to tourists, until you enter the Mojave Desert, arid, bald, and bare; yet with a strange wild beauty of its own. Emerging therefrom you surmount and wind around mountains, or pass by tunnels that are marvels of engineering, into and through the heart of obtruding ranges, until you pass again into the region of the orange tree—the land of health, fertility, and beauty of which Los Angeles, city of the angels, is the center. A writer in the *San Francisco Bulletin* gave in a recent letter an animated account of a late trip, from which extracts are made as follows: "Of the remarkable triumph of engineering science exhibited in crossing the formidable mountain ranges lying between the head of Kern Valley and the Mojave Desert, I shall not here speak. The fame of the 'Loup' has become world-wide. I know of nothing like it, unless it be the road over the Styrian Alps from Vienna to Trieste; and even there, if I remember rightly, the track does not literally 'cross itself.' The loup is located midway between Girard and Keene, 340 miles from San Francisco. Its length is 3,795 feet; difference in elevation, 78 feet. Between Caliente and the summit there are no less than seventeen tunnels, the longest being, I believe, about 1,300 feet. Although the summit of the Tehachepe is nearly 4,000 feet, the climate is so mild and agreeable that the grazing is excellent, and in good years very good crops are raised. The descent to the Mojave Desert is gradual and easy, presenting little of the engineering difficulties of the other side. At Mojave station is a considerable cluster of buildings, consisting of a railroad round-house, work shops, hotel, and the Cerro Gordo Transfer Company's depot. This place enjoys the unenviable distinction of having the worst climate of any point between San Francisco and Yuma. The wind blows viciously even in the best of weather, while not infrequently the most fearful sand-storms prevail. The station master informs me that he has found it next to impossible to make even the most hardy trees grow. Nothing but cactus, or a stunted species of sage-brush, seems to enjoy this dreary desert wild. One species of the former grows to enormous dimensions, sometimes attaining a diameter of two or three feet, and a height of forty to fifty feet. Seen from a distance, a grove of this cactus has the appearance of an orchard of fruit trees.

"Leaving the Mojave plains, the road enters the Soledad Pass, winding its way through a series of mountain defiles until it is confronted by the solid mass of the San Fernando range. Here the engineer looked in vain for a feasible route *over* the mountains, and so solved the problem by piercing *through* them. The San Fernando tunnel is one of the longest in America, having a length of 6,967 feet. This is a magnificent piece of work, and deserves to stand as a perpetual monument to the enterprise and daring of its projectors and builders. As we emerge from this tunnel, the valley of Los Angeles dawns a vision of beauty upon us. Leaving the desert and the mountains behind us, we enter a new world of verdure and fruitfulness—a land literally 'flowing with milk and honey.' A short run brings us to the famous Mission of San Fernando, with its lovely groves of lemon and orange trees."

Twenty-two hours from San Francisco, and the express arrives at Los Angeles. The first view of the city is disappointing, but the traveler will soon find that it justifies all the encomiums that have been made on its beauty. Looking to the west and south, the tourist will be gratified at the tropical wealth the fertile soil and fructifying climate pour out. Here may be seen the orange, lemon, pomegranate, and fig tree in perfection and profuseness. The thriftier vineyards stretch away for miles, and the traveler will say, as the writer already quoted does, that "the spell of the fascination of the 'City of the Angels' fell upon me. * * Los Angeles is not only a beautiful, but an enterprising town."



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SAN FERNANDO TUNNEL
South Portal.

Los Angeles is the second railroad center in the State, and though somewhat unfavorably affected at present by the completion of the road to Yuma, the readjustment of traffic and the rapid growth of Southern California and Arizona—sure to come—will more than compensate for any temporary depression. The main trunk of the Southern Pacific connects Los Angeles with San Francisco, and Arizona on the south. It has two railway connections with the sea: by the Los Angeles and Santa Monica Railroad, seventeen miles long, and by the Los Angeles and Wilmington Railroad, twenty-two miles long. It is connected with the southern interior by the Los Angeles and Anaheim Railroad, twenty-nine miles long. This latter line is being extended some twenty miles further south, to tap the fertile region known as the "Gospel Swamp"—a region where they talk of one hundred bushels to the acre of corn. When the system of local railroads is extended and completed, so that Los Angeles is put in direct commercial relation with nearly every garden spot in the southern part of the State, it will realize more clearly than it does or can now the beneficial effects of being the center of a railway system whose iron arms stretch out to every point of the compass.

The traveler should not fail to stop over and visit Santa Monica, a point not only of great natural beauty, but sure to become one of commercial importance. To the whole of western Arizona, especially its northern portion, Santa Monica will, before many years have passed, become the chief port of shipment. Situated on the Pacific Coast, 361 miles from San Francisco and 268 from Yuma, it is not only a famous watering place, but the natural port of Los Angeles and all the region south and east as well. For picturesqueness of site, perfection of climate, and natural facilities for trade and commerce, it is without a rival on the long stretch of coast south of San Francisco. It is destined, above all, to become the great sanitarium on this side of the continent, and already has been styled by admiring tourists and appreciative journalists "the Long Branch of the Pacific Slope." And well does it deserve the title. The embryo city is the result of an inspiration of genius which perceived at a glance the vast possibilities the site presented, and the practical sagacity which at once took hold of the idea and realized it. Here, until near the close of 1875, the solitary shepherd tended the flocks of the ranchero. There was no sign of industrial activity, no attempt to utilize the conspicuous natural advantages of the place. Seasons came and went without change of any kind. Still the ranchero and his native herdsmen looked without appreciation upon the grand background of the San Madre range, which was only interesting to them as it harbored the marauding puma, and provided feed in seasons of drouth for their sheep. Year after year they gazed upon the wide stretch of ocean, nor dreamed that the horse-shoe embayment within their range of vision was a land-locked harbor, capable of sheltering the commercial navies of the world. But so it was. Measured from Point Dumé, on the west, to Point Vincent, on the south, Santa Monica bay is twenty-eight miles wide, and the indentation at the now rising city is about ten miles deep. This wide stretch of deep water would get up heavy seas in rough weather, were it not effectually protected from the prevailing wind. Nature has provided natural barriers, however. The headlands named, and an outlying group of islands whose picturesque outline is visible from the city, shelter Santa Monica bay in all seasons, and never since the opening of the port has there been any interruption of sea traffic, although the steamers have frequently been forced to pass other southern California ports, and the sea has occasionally played havoc with their wharves.

Senator John P. Jones became the purchaser of the Santa Monica property, and at once projected the improvements which have since been effected. A land company was formed, and on the 15th July, 1875, the first land sale was held. This was the initial step. The crowds which attended the land sale and the prices realized proved the soundness of the judgment which entered upon the speculation, and new life and energy were infused into Los Angeles county. Building began in October, 1875, and there is at this date, (November, 1877) a well-built town containing about 1,000 inhabitants, while the demand for city lots is steadily increasing. There is not a vacant house in Santa Monica, and the demand for accommodation by pleasure-seekers cannot be supplied either at the hotels or private dwellings.

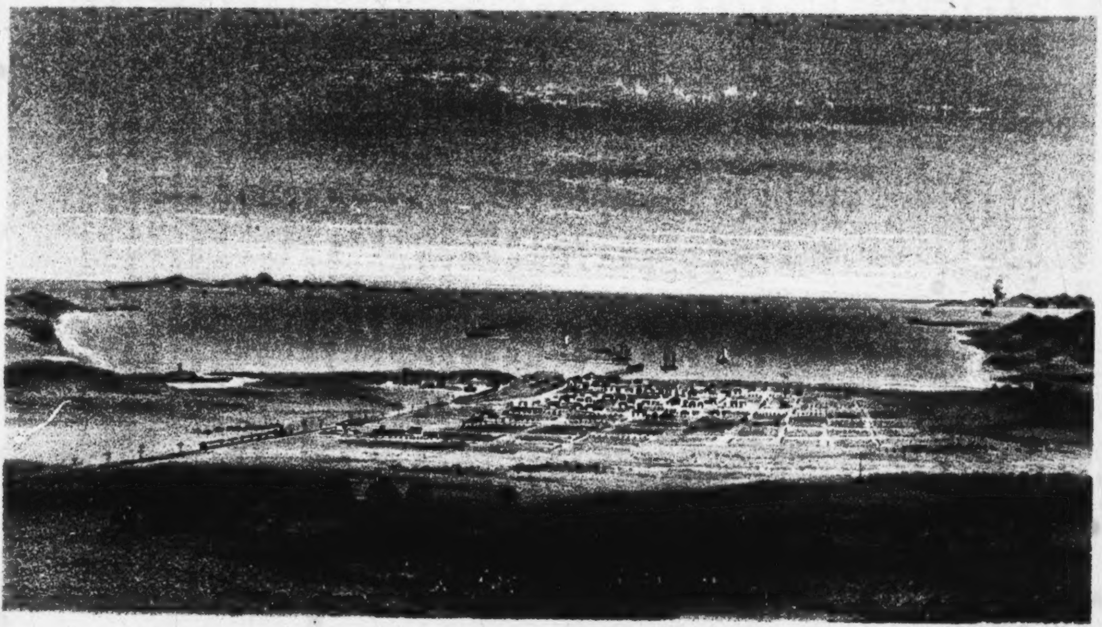
Santa Monica has a well built school-house, erected at a cost of $5,000. The Presbyterians and Wesleyans have built churches on sites donated by the land company. A water supply has been brought in from the old Mission Springs, a distance of three miles, adequate for a population of 5,000. The distribution service has been completed. A weekly newspaper, the *Santa Monica Outlook*, is also printed and published in the city. It is one of the best district newspapers in California. The houses are well built, and the stores are furnished with goods of every description. "The Santa Monica" is one of the best appointed hotels on the Coast. It is a large and well furnished building, capable of accommodating 200 guests without crowding, and commands an uninterrupted view of the Bay, islands, mountains, and plain stretching back to Los Angeles city. There are several other hotels which are favorite resorts of health and pleasure seekers.

But the chief attraction is the bathing facilities. There is the most extensive and best appointed bathing establishment on the Coast, in which hot and cold baths, with salt and fresh water, plunge and swimming baths may be had at discretion; reading and coffee rooms are connected. A large hall for assemblies, balls and receptions is likewise attached to the building; while on the beach, on the sloping sand, bathers have every convenience provided. Bathing is practised in the open air at all seasons. The average mean temperature for the year 1875–76, from September to August inclusive, was 61.8 degs. In December 1875, the temperature averaged 58 degs., and in August 1876, it averaged 68.4 degs. The average temperature of the water was 61 degrees. The residents of Arizona, especially those living in its southern section, already begin to make of Santa Monica a sanitary resort. The town is well laid out in rectangular squares, the streets and avenues are wide, and planted with shade trees which have already a vigorous growth. A central park of five acres has been planted by the land company. A race track fronts the city, along Ocean avenue. The town site is one square mile. Outside its limits the estate has been laid off into small farms of five acres and upwards, and quite a breadth of land has been bought and placed under cultivation. Los Angeles is, however, fast extending seaward, and within a dozen years at furthest it may be confidently predicted that the Queen City of the Angels and the Pride of the Pacific, beautiful Santa Monica, will be connected by an unbroken chain of villas, and orchard and orange groves.

The enterprise which founded Santa Monica also connected it with the outer world. A wharf 1475 feet long was built into deep water, and a railroad seventeen miles in length connected this port with Los Angeles, thus making Santa Monica the nearest and best outlet for a region of over three million acres, rich in every mineral and vegetable product, and insuring its future connection with a much larger area. The railroad was opened on the 10th December, 1875, and passed into the hands of the Southern Pacific Railroad Company by purchase in June, 1877.

Steamboat and railroad connection render Santa Monica one of the most thriving towns on the Coast. Game of all kind is abundant in the neighborhood. Vegetation is prolific in the extreme. Located about midway between Arizona and San Francisco, on the direct line of travel, Santa Monica must become the watering place of that vast mineral producing territory; and visitors from Colorado, New Mexico and Texas will in the not distant future come to enjoy its unrivalled beauty and health-giving climate, as pilgrims from Europe and the Eastern States have already done. The view here given will prove that the praise accorded to its beauty of site and surroundings is fully justified.

After returning to and leaving Los Angeles, the road follows in general the Santa Ana Valley, passing the Mission of San Gabriel, one of the best preserved evidences of the remarkable energy and devotion manifested by the old Spanish missionaries; who, led first by Padres Niza, Escalante and Kino, with their associates, from 1540 down to 1790, made their way through great peril and amid startling privations from the city of Mexico northward across the wild and desolate regions of the Primeria Alta and Nuevo Mexico, to the Gila and Rio Grande valleys, penetrating north and westward to the Rio Colorado and across the Great Plateau, visiting the Moqui, and finally reaching over mountain and desert to the sounding shores of the Pacific, dotting a large area with the missions they established, and whose presence still preserves the evidences of their power, religious devotion, and organizing endeavor. Glimpses of San Bernardino, the Riverside settlement, and other points both lovely and productive, are seen. The designation of the "Lombardy of California" is not without justification. If the traveler passes any time in this portion of the State he will naturally find much to interest him. The whole region is worthy a visit. Returning to the road, the train soon leaves this attractive region, and begins its toiling up the San Gorgonio Pass, crossing and descending which the region begins to look more poor. In fact, the country goes to the bad altogether as the train descends into Colorado Desert. This was once the bed of a great inland sea, and there are those bold projectors who believe it possible to again pour into this basin the superabundant waters of the Colorado. Were it practicable, and this is not denied in toto, the whole aspect of both southwestern Arizona and southern California might be changed thereby. Quoting the newspaper writer already referred to, the following illustrates the present aspect of the region:



LITH. BRITTON, REY & CO. S.F.

SANTA MONICA HARBOR
AND SURROUNDINGS

"No pen can describe the utter desolation of this region. The valley of the lower Jordan and the shores of the Dead Sea are not more barren. For many miles not a shrub or even a blade of grass is seen—only a howling wilderness of rock and drifting sand. As we approach Indian Wells the country improves slightly. We see in the distance, along the base of the foothills, clusters of palm trees; various forms of cacti, peculiar to this valley, appear; the mesquite tree relieves the eye with its tufts of green, and the sage brush ekes out a sickly existence. From the San Gorgonio we gradually descend until, two miles west of Indio, we reach the level of the sea. From this point, for a distance of *sixty-one miles*, we descend further and further into the depths of this extinct ocean bed, until, near Dos Palmos, we are *two hundred and sixty-three feet below the sea level!* The line of the road runs for a long distance over the bed of a dried lake. Its beach is well defined; the water marks are as distinct as if made but yesterday. Everything indicates that we are passing over a former ocean bed. We can almost fancy we hear the waves surging against the silent shores; can see noble ships sailing across this trackless waste.

"One of the greatest difficulties in the construction and operation of the railroad has been the absence of water. The railroad company have spent a great deal of money in sinking artesian wells, but thus far with indifferent results. At Flowing Wells they struck a fine body of salt water at the depth of about 160 feet, and at Mammoth Tank they have bored 164 feet through the hardest kind of hard pan, but as yet have not found a drop of water. They propose to continue the work of boring at this point until the question of water or no water is definitely settled. At present over seventy miles of the line have to be supplied with water by water cars. Tanks have been built underground at the various stations along the waterless region. They are lined with brick and have a capacity of several thousand gallons.

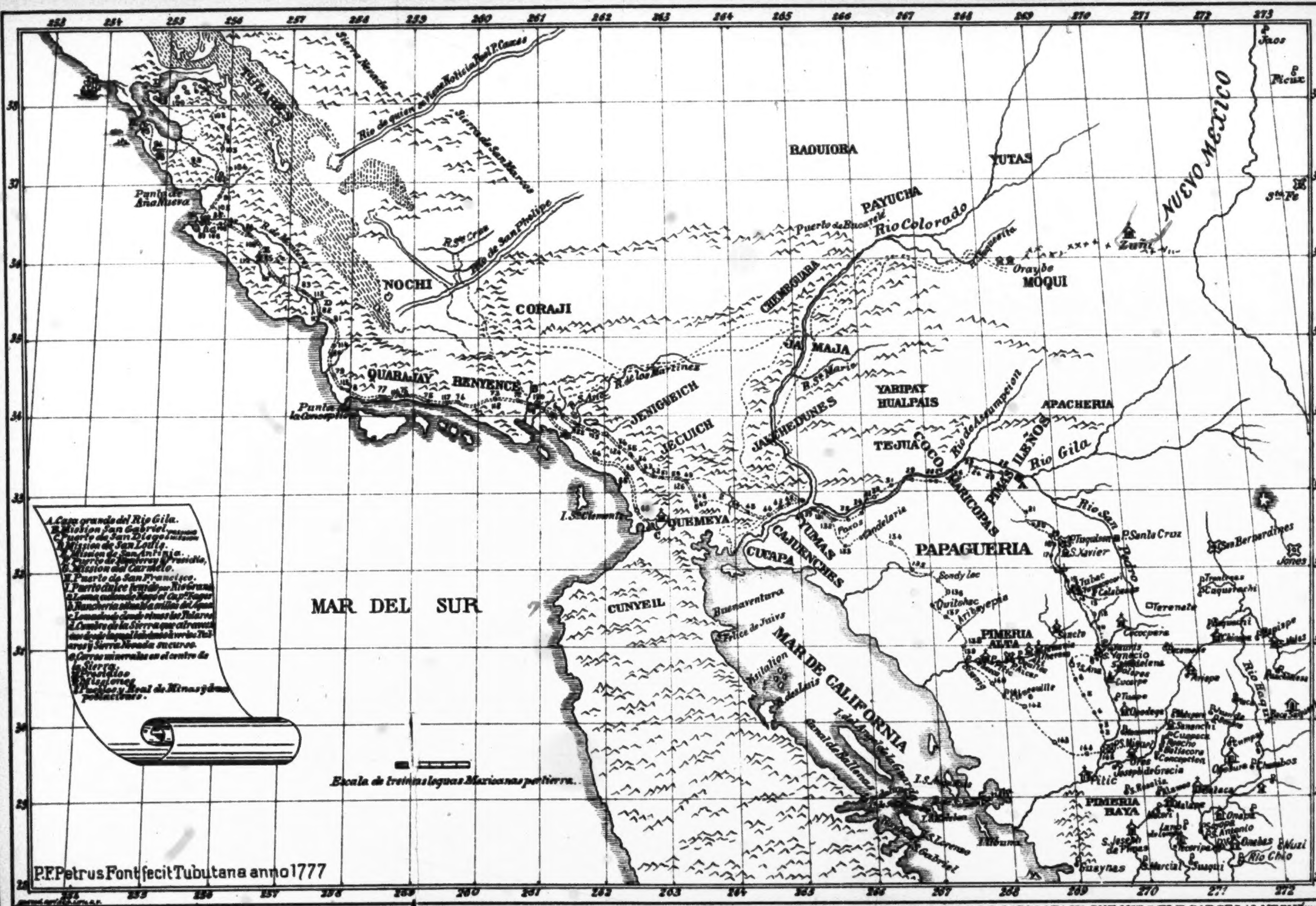
"There are immense salt deposits in the Colorado Desert, the largest having an area, I am told, of 100 square miles. Mud volcanos also abound. I saw one in full blast. The mud was spouting up through at least twenty holes, in some instances rising in a vertical column several feet high; in others, boiling up in a lazy sort of way, very much as I have seen mush boil in a kettle over a slow fire. Below the surface a rumbling sound was heard, while through crevices of the ground a noxious vapor arose. Near by was a second volcano, partially extinct, but here and there mud oozed out. On its outer rim lay, side by side, two little birds dead. They had evidently been attracted by the moisture, had inhaled the fatal gas and been stricken down. There was something pathetic in the fate of the beautiful little creatures—evidently mates—coming to this deadly spot to quench their thirst, and perishing thus miserably. These 'volcanoes' are cold. A few miles off are a number of spouting hot springs. A railroad employee, who visited them a short time ago, broke through the crust into a boiling lake of water and was terribly scalded. The whole region hereabout is so strongly suggestive of a certain unmentionable bad place, that I was glad to get away."

There is one aspect of this region, undesirable as it is otherwise, which compensates for much. Reference is made to the deliciously clear and ozonized atmosphere. The air is free from all impurities; and crossing in the cars one realizes the climatic change, without feeling too many of the disagreeable characteristics of the region. At Dos Palmas is the terminus of the California and Arizona stage line, and the coaches of this company leave and arrive there daily for Ehrenberg, Wickenburg and Prescott. The nights are deliciously clear, soft and mild, no matter how hot the day may have been. One of the great difficulties both in construction and running encountered by the railroad, are the sand storms, which, like those of the Sahara Desert, are a feature of a region that strangely recalls that historic waste of sand and aridity. The engineers had to drive piles in many places, and sheds, like those on the Central Pacific, are proposed to protect this route against the drifting sands. Early morning brings one, forty-two hours after leaving Oakland, on the Bay of San Francisco, in sight of the verdure-fringed Colorado. The railroad front is now on the east bank of the river. It presents a busy scene, illustrative of the manner in which American towns grow into cities. The bridge is a substantial, five-span Howe truss, the draw of which is on the Arizona side. Yuma is not a specially inviting place; and yet, by contrast, after crossing the weird, wild and almost ghostly region known as the Colorado Desert, and whirling for several miles over its western rim, through the detrital margin of an ancient sea, the Colorado bottom-lands and the busy town beyond, with the green masses of cottonwood; the greasewood, a tree with dwarf, plumy, leafless branches; the mesquite, with its feathery-looking leaves and graceful branches; and the pretty clumps of arrow-reeds that everywhere greet the traveler's eye, with the growing evidences of human civilization and enterprise on the further bank, combine to make a pleasant picture in one's memory, and prove a not uninviting one in the active present. It would not be difficult to describe the outward aspect of the scene thus:

Sandhills to right of them,
Sandhills to left of them,
Sandhills in front of them,

Is what the people of Yuma might say, if inclined t paraphrase the musical numbers of Tennyson. The western bank of the Colorado is chiefly a long, low stretch of alluvial bottom-land, overflowed by the great river and enriched by the detritus it has borne from the heart of the northern Cordilleras for centuries past. To the north and west is a group of adobe buildings, crowning a low, sandy height, which since 1852 has been the sign and symbol of our Uncle Samuel's presence in and ownership over these wilds. Fort Yuma is not a very imposing, though quite a noticeable affair. Old Glory flies there to gladden the wayfarer's eyes. At the east bank lie long freight scows, for they are little else, called by courtesy steamers, which navigate in part the Colorado River. The rope-guided ferry-boat swings busily to and fro, carrying a daily increasing traffic. There are a score or so of barelegged, breech-clouted Yumas, (Indians) of sinewy frames, who hang about this vicinity; have no reservation, and who, giving no evidence of an inclination to cut the white man's throat, have no agent, blankets, grub or presents from this paternal Government of ours. These Indians work willingly if not continuously. Yuma itself is on a level, sandy plain of one prevailing gray ashen tone. The chief street is broad, and that 's all. There are two or three side streets, ambitious in name if not in style. The sun is almost blinding, and the prevailing hue monotonous. And yet there is a wonderful feeling in the dry, ozonized atmosphere, which makes you forget the heat and feel the value and pleasure of physical being. Oh, the color-tones of sky and distant mountain peaks! Such deep, translucent azures; such pearl-gray touches in the clear, arching heavens! Such wondrous purple tones in the distant hills! They would delight the eye of Virgil Williams; inspire the brush of Thomas Hill, and make even Bierstadt's melo-dramatic canvas and colors turn pale! The clear skies of the Sahara, the dry, wondrous atmosphere of the desert, are here; all strange aspects which the traveler recalls from the Nile and Syria, from Algeria and the southern shores of the Mediterranean, are again evoked at this point on the outskirts of civilization. It is the massive front of the race itself, and brings the ancient myths back to the imagination.

Looking to the north and east, beyond and across a wide expanse of valley and mesa, is the remarkable range known as the Castle Dome, between which and another one to the west, which exquisitely formed is marked on the map as the "Purple Hills," the Colorado forces its turbulent and devious way. Turning towards California the eye rests upon bold peaks to the northwest, and on the "Cargo Muchacho" to the south. Both these elevated ranges, islands rising out of the silent sea, (the wide waste of sand that glistens white in the burning sun, and marks where the waves once flowed) are full of the richest of gold-bearing quartz. In proof of it, nuggets of gold—the indestructible "what is it" of the geologist, chemist and assayist—are shown. The southern group lies close to the railroad. The geological formation hereabouts indicates comparative newness. The bluffs of unsolidified limestone, the rich, sandy alluvium, and the detrital mesa hills and buttes, all testify to this. So also do the granitic rocks of the "Cargo Muchacho." But the traveler fresh to the region will be at first concerned more with the picturesque rather than the utilitarian aspect of things; and the serrated purple hills, ranges and peaks, so constantly changing their aspect and outline in the rarefied atmosphere and heat, form a mirage vail that plays magic tricks with the vision of man, and are a continued delight to the artistic sense and imaginative vision.


MAR DEL SUR
MAR DE CALIFORNIA
NUEVO MEXICO
PAPAGUERIA
PIMERIA ALTA
PIMERIA BAYA
APACHERIA
MOQUI
Oraybe
Zuñi
YUTAS
PAYUCHA
BAQUIOBA
TULARES
NOCHI
CORAJI
QUARAJAY
BENYENCE
JENIGUEICH
JECUICH
QUEMEYA
CUNYEIL
CUCAPA
CAJUENCHES
YUMAS
JAMAJA
JAMCHEDUNES
CHEMEGUABA
YABIPAY HUALPAIS
TEJUA
COCO MARICOPAS
PIMAS
ILEÑOS
Rio Colorado
Rio Gila
Rio de Asumpcion
Rio San Pedro
Rio de San Phelipe
Rio de quien se tiene Noticia por el P. Garces
Sierra Nevada
Sierra de San Marcos
Puerto de Bucareli
Punta de Ana Nueva
Punta de la Concepcion
I. Sta Clemente
Buenaventura
Sta Fe
Jaos
Picux
San Bernardino
Jones
Tubac
S. Xavier
Tuquison
Santa Cruz
Terenate
Caborca
Altar
Opodepe
S. Miguel
Ures
Pitic
Guaymas
Rio Chico
Rio Yaqui
A. Casa grande del Rio Gila.
B. Mission San Gabriel.
C. Puerto de San Diego.
D. Mission de San Louis.
E. Mission de San Antonio.
F. Puerto de Monterey y Presidio.
G. Mission del Carmelo.
H. Puerto de San Francisco.
I. Puerto dulce formado por Rio Grande
a. Lomas
b. Rancheria
c. Lomas donde vimos los Tulares
d. Cumbre de la Sierra
e. Cerros minerales en el centro de la Sierra.
f. Presidios
g. Misiones
h. Pueblos y Real de Minas y demas poblaciones.
Escala de treinta leguas Mexicanas por tierra.
P.F. Petrus Font fecit Tubutana anno 1777
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MAPA CORRESPONDIENTE AL DIARIO QUE FORMO EL P. F. PEDRO FONT DEL VIAGE QUE HIZO A MONTEREY Y PUERTO DE SAN FRANCISCO, Y DEL VIAGE QUE HIZO EL P. GARCES AL MOQUI (1775)

CHAPTER II.

AN HISTORICAL SKETCH.

THE SPANISH EXPLORATION. AMERICAN PIONEERS. AMERICAN ACQUISITION. THE GADSDEN PURCHASE. THE FRONTIER LIFE. WITHOUT CIVIL GOVERNMENT. FILIBUSTERS. CRABB AND PARTY. ABANDONMENT DURING CIVIL WAR. TERRITORIAL ORGANIZATION. APACHE OUTRAGES AND DESOLATION. SPARSE SETTLEMENTS. THE CIVIL WAR AND ITS EFFECTS. LEGAL ORGANIZATION. SPEECH OF SECRETARY MCCORMICK, ETC.

Nearly three and a half centuries have passed since the Spanish Viceroy, Mendoza, in 1540, ordered an exploration of the region we now know as the Territories of Arizona and New Mexico. There was a period of marked activity in this direction, but it did not last long or have any very marked and permanent result. There was not enough gold and silver worked and at hand to satify Spanish cupidity. The ancient peoples, with the progenitors of those whom we recognize as Pimos, Papagoes, Moquis and Pueblo Indians, were too feeble to excite assault, and the Apaches too strong not to harass the Spaniards for many generations. For at least 280 years preceding the Treaty of Guadaloupe-Hidalgo in 1846, when all the region north of the Gila and Mesilla Valleys and west to the 117th meridian was incorporated within the area of the United States, anything like a full exploration was untried. From the occupation of New Mexico until February, 1863, Arizona was included within the boundaries of the sister Territory. At the date of Mexican transfer, within that portion of the ceded territory now embraced by Arizona, there were but two villages containing Mexican or other white inhabitants. The Apaches occupied the territory; the Mexicans were in the two villages of Tucson and Tubac, with a few ranches near by. According to the Spanish map, herewith presented, there was, in 1775, not a mission or settlement in the Valley of the Gila, or north thereof. The whole region was but sparsely occupied by Indian tribes. On the Gila, about midway between Apache Pass and Fort Yuma, the "Pimos Illños" and the "Coco-Maricopas" were at work, as they have been ever since. A little to th northeast, Apacheria was located. This is the region of the Gila Cañons, the Arivipa Valley and Cañon, the Jonto Basin, and the territory now embraced by the present White Mountain Reservation. South of the Gila, "Papagueira" was located. In the neighborhood of Yuma were the Indians of that name, while in the valley below were the Oajuenches and the Cucassus; north of Yuma were the "Jakechedunes." On the plateau were the Moqui, while the Jamalas, Hualpais and Yalipays were south and west of them, and in or near the Colorado Valley. South of Tulquson, (now Tucson) direct to the present line of Sonora and below as far as the 28th parallel, was a long line of thickly located presidios, missions, pueblos and mining stations. It will be seen, on an examination of the map from the line of 30 deg. north to about 32 deg. 30 min., and between the degrees of longitude 271 deg. west to 269 deg., that there were in the space indicated, ten settlements. These included Tuqulson (Tucson) and Tubac, both occupied still as places of trade and habitation, and both destined to be of importance, and that of Santa Cruz, long since abandoned. The missions were Cocoperéa and Sancto, both obliterated; Tumacacori, now in ruins, and that of St. Xavier, still under charge of the Society of Jesus, to whom it was restored in 1863, by the Hon. C. D. Poston, under instructions while serving as Superintendent of Indian Affairs. The pueblo of Babocomori —wrongly located; the presidio of San Bernardino—also misplaced on this map, are merely names; while the Tereuate pueblo is placed near or about the present location of the abandoned presidio of San Pedro. The Spanish power on the border had already begun to decline rapidly at the date the map was compiled; and an insurrection which occurred a few years before had made a serious inroad into the prosperity of the Santa Cruz Valley. Calabasas was a ranch and mining camp of importance. Spanish records show 200 silver mines as being worked in the section under consideration; but the rapacity of the Madrid and vice-regal governments proved a continual check to the enterprise of the people and the development of the country. It was a barrier more fatal even than the restless hostility of the Apache.

From the date of the old map herein published for the first time, Spanish Arizona had begun to decline. An Indian outbreak in 1802, and the Mexican revolution twenty years later, with the Apache uprising of 1827, made a practical end to either Spanish or Mexican rule. Tubac was really abandoned in 1840, though Mr. Bartlett found about thirty soldiers there in 1850. Tumacacori was destroyed some years before the first date; the several ranches were held only by Indian sufferance and amid great peril; mining was virtually suspended, while Tucson and Tubac were only protected from complete ruin by small garrisons. The Mexican authority north of Tucson and west of the Rio Grande, into the coast range in California, was the merest of myths. Two points of industrious life were found—one on the Gila, where the Pima and Maricopa villages still exist, and the other in Papagueria, where the Papagoes maintained a severe struggle against their Apache foe, whom they usually defeated; and another also against nature's aridity, by which they were often worsted. But very few Americans—renegades and fugitives from justice too often—were to be found in the region indicated.

The first authentic knowledge obtainable of American pioneers was by the arrest of a couple of Kentuckians, father and son, whose history was told by Col. Poston, when delegate in Congress, during 1864–65, as follows:

"In the year 1824, Sylvester Pattie and his son James, from Bardstown, Kentucky, with a party of one hundred hardy and adventurous frontiersmen, set out upon a trapping expedition to the head-waters of the Arkansas River. After many romantic adventures in New Mexico, the party dispersed, and a few of the boldest spirits undertook to reach the Pacific Coast. They spent one winter at the celebrated mines (copper) of Santa Rita del Cobre, at the head-waters of the Gila River, and the next spring trapped down the river to its confluence with the Colorado. Here they embarked their canoes on the turbid waters of the Colorado, and drifted down to the Gulf of California, whence they crossed the peninsula (Lower California) to the Pacific Ocean. Here they were imprisoned by the Mexican Commandant at San Diego, and after a long and cruel confinement, the elder Pattie died in prison."* James Pattie was then released, and all traces of him have since been lost. Of another and more fortunate pioneer, one whose name and person are esteemed and honored, Mr. Poston said, at the same time:

"The oldest living trapper in Arizona, at this day, is old Pauline Weaver, from White County, Tennessee. His name is carved in the Casa Grande, near the Pima villages on the

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* House of Representatives, March 2nd, 1865.

Gila River, under date of 1832. This old man has been a peacemaker among the Indians for many years, and is now spending the evening of his life in cultivating a little patch of land on the public domain in the northern part of the territory, on a beautiful little stream called the Hassiamp" (Hassayampa). Mr. Weaver was the original discoverer of the famous placers near the Antelope Peak, on the road between Wickenburg and Prescott—about forty miles south of the latter place. The Valley of the Rio Grande in New Mexico proper was more densely settled, and a few trappers, guides and hunters, of American and half-breed birth, occasionally penetrated Arizona. Among these was a Frenchman named Leroux, well known to the Pimas, who acted as guide to the United States Boundary Commission in 1849–51. Felix Aubrey, author of an interesting book on New Mexico, who was killed at Santa Fé in a broil, while preparing for an expedition to prospect for gold in Arizona, made several trips into the Tonto Basin, now embraced by the San Carlos or White Mountain Reservation, the Gila Valley, the Santa Rita Mountains and other portions of the territory. The traces are meagre of the other stray pioneers who had at various times entered this territory. Among the earlier explorers was a Captain John Moss, who penetrated the cañons of the Great and Little Colorado. A Captain Adams is also known as an voyager on the same river. After the discovery of gold in California, the Valley of the Gila became an highway for the more daring and adventurous of those, who from 1849 on, made their way from the southwest to the new El Dorado. Some remained in Arizona, and some are still living there. The wild and terrible story of the Oatman massacre is associated with this daring emigration. Mr. Bartlett, United States Boundary Commissioner, in his "Personal Narrative," gives interesting incidents of the encounters and meetings his command had with such emigrants. Prof. John Davis, of the Aztec Mine, tells of his journey from California across the Gila Valley and down the Santa Cruz into Sonora. The San Xavier Mission Church at that time was occupied by a Mexican, and the ranches at Canoa, Revanton, Sopori, Calabasas and Arivaca were under cultivation to a limited extent.

The cession of Arizona and New Mexico, north of the Gila and Mesilla valleys, was consummated on February 2d, 1848. The balance of these territories, known as the Gadsden purchase, was not acquired until December 30th, 1853. The United States Boundary Commission was the first body of Americans, known to the country at large, which entered the borders of

Arizona. The latest acquisition is, without doubt, in its larger part, the most desirable. It was 460 miles, from east to west, and ranged in width from 130 down to 40 geographical miles, the latter at its western line, near Yuma. Prior to its purchase, it formed a part of the Mexican State of Sonora. In negotiating for the purchase of this territory, General Gadsden made strenuous efforts to secure a strip of country as far south as Guaymas, but was not sustained by Congress, and thus the most important feature in the treaty is omitted—a port on the Gulf of California. "It is possible," wrote J. Ross Browne, in 1864, "that some vague notion prevailed in the halls of Congress that the difficulty might be remedied by a port at Fort Yuma or the Pimo villages." The region was practically a *terra incognita* to the American people. A few of the more astute southern politicians, who had been in and studied Mexico, knew something of the prospective value it possessed; and there is not the slightest reason to doubt that its acquisition formed a point in the scheme for establishing a Southern Confederacy, which was a vigorous conception in many minds, even at the time. The Boundary Commission began its work in the summer of 1849. The first commissioner appointed was John B. Weller, and Andrew B. Gray, a well-known engineer, was made surveyor. Major (now Colonel) W. H. Emory, Captain E. L. F. Hardcastle, and Lieutenant (now Colonel) E. W. Whipple, U. S. Engineer Corps, were detailed for the scientific and field work necessary. The Commission first assembled at San Diego, Cal., and in February, 1850, finding it almost impossible to advance beyond the Colorado, because of the difficulties of outfitting, an adjournment was had till November of the same year. Colonel Fremont was soon after substituted for Mr. Weller, but did not enter on the duties of his position, because of his election from California to the United States Senate. J. D. Bartlett, Esq., of Providence, R. I., was commissioned in June, 1850, and entered at once on the active discharge of the required work. Among those connected with the Commission was its Secretary, Dr. James H. Webb, of Boston, afterwards well known to the country for the part he took some five years later in organizing the Free State Emigration to Kansas, as the Secretary of the New England Emigrant Aid Society. Lieutenant J. G. Strain, U. S. Navy, was also a member. He will be remembered because of his untimely death while conducting an exploration of the Panama Isthmus. Andrew B. Gray remained as surveyor. He afterwards conducted the first railroad exploration on the 32d parallel. Captain Edward Barry, a Mexican war volunteer, took charge of the mechanics and laborers. Colonel J. C. Cremony, now a well-known San Francisco gentleman, and author of a very readable book, entitled "Life among the Apaches," who afterwards served with the California column of volunteers that, under General J. H. Carlton, in 1862–3, reoccupied Arizona for the Union during the civil war, was employed as interpreter. George Thurber, whose name is known as a scientist, was the botanist of the commission, and Theodore F. Moss acted as geologist and mining engineer. Among other names, since better known to the country, who served with the commission, are those of General Ambrose E. Burnside, now United States Senator, and Colonel Michler, of the Engineer Corps. On the Mexican Commision, or connected therewith, now familiar to Anglo-American ears, is that of Lieutenant Dias, now President of the Mexican Republic. The work of this commission was of great benefit, and occupied several years; Mr. Bartlett retiring, however, in 1852 Following their survey were the explorations for a Pacific Railroad, the 32d parallel line being always a favorite route, and sustained by southern influences. Major Heintzelman, now a retired Brigadier-General, located Fort Yuma, in 1851, and was the first to permanently represent the United States Government in the Colorado Valley. Lieutenant Ives explored the river and its cañons in 1854.

The reports of Lieutenants Whipple, Washburne, and Williamson are very valuable. The latter made a survey of the country north of the Gila, in view of a route for a railway from the Atlantic to the Pacific States. Lieutenant A. B. Gray, in 1854, made a survey from Marshall, Texas, to El Paso, and thence across the country to Tubac, from which point he made branch surveys; one to Port Lobos, on the Gulf of California, and the other to Fort Yuma and San Diego. Lieutenant Parke, in 1854–5, made a survey of a route from San Diego to Fort Yuma, the Pima villages, Tucson, El Paso, and into northern Texas. Lieutenant Edmund F. Beale, recently U. S. Minister to Austria, made several explorations through Northern Arizona, the reports of which were published from time to time by Congress. They are valuable for the information contained. Capt. Simpson, now General U. S. Engineer Corps, and Dr. Newbury also explored portions of Northern Arizona. In 1855, the Boundary Survey was completed by Major Emory and Lieutenant Michler. In 1854, Mr. Charles D. Poston, a private citizen, landed at Navachista, on the Gulf of California, and explored the country as far as western Sonoita, and thence through the Papagoria to the Big Bend of the Gila, Fort Yuma, and San Diego. In August, 1856, an exploring party outfitted at San Antonio, Texas, and after a perilous journey through the Apache Pass arrived at Tubac, and proceeded, under the direction of Mr. Poston, to examine the silver mines reported to exist in the Santa Rita, Cerro Colorado, and Arivaca Mountains; and in 1857 companies were formed for the purchase and development of these mines. In August and September, 1857, the San Antonio and San Diego semi-monthly stage-line, under the direction of I. C. Woods, was established; James Burch acting as contractor. This continued until the Butterfield semi-weekly line was put upon the route, in August, 1858, under a contract of six years with the Postmaster-General, at $600,000 a year. The usual time was 22 days from San Francisco to St. Louis, and until the outbreak of the southern civil war in 1861, there was not a single break in the service. During these years, Arizona nominally formed part of the Territory of New Mexico: practically it was under the control of the Apaches.

The history of the terrible struggle which the Apache has maintained can never be fully written. Its details are too sickening to bear more, in the new era that opens to Arizona, than a passing review. It will be a generation or more ere the stories of "hair-breadth 'scapes" and horrors of massacre and fight will begin to die away. It has not been all the Apaches' work either. Wars with the Yumas, Hualapais and Mojaves have been severe. Arizona became a shelter for desperadoes also, and it had long been a shelter for the Mexican *gambrusinos*, mine robbers, horse thieves and cut-throats. No civil law existed, and the one common dread of the savage was the cohesive tie that maintained the small amount of social order that existed. For three centuries these Bedouins of the desert had continued their depredations upon stock, robbing the ranches, killing the rancheros, and harassing emigrant parties. No industry could prosper under their malign influence. None did thrive, either in Arizona or Sonora. Colonel Cremony tells graphically of the difficulties a portion of the U. S. Commission under Dr. Webb encountered from the hostility of the Yumas, at the very point where now the fine railroad bridge assures the traveler that the frontier is vanishing before the advance of enterprise and industry. The same gentleman describes a return to Arizona a few months later, and one of the adventures of the party will serve to illustrate dangers which all ran who sought to explore the territory at the time. The encounter described occurred near Grinnel's Station, on the Gila. The party did not expect an attack in so open a place. The dusty character of the road veiled the savage foe, until, as the party neared a clump of yucca trees, and while they were shrouded in a cloud of dust, a sharp, rattling volley was poured in. Two mules and three horses were killed by the fire, the dense dust making doubtful the aim of the Apaches. The balance of the story will bear telling in Col. Cremony's own words:*

"It was no time for hesitation, and the order was at once given to dismount and fight on foot. We could distinguish little or nothing; shot after shot was expended in the direction of the savages; now and then a dark body would be seen, and made a target of as soon as seen. Each man threw himself flat upon the ground; but scarcely any could tell where his companions were. It was pre-eminently a fight in which each man was on 'his own hook.'

"While we laid prostrate the dust settled somewhat, and we were about to obtain a good sight of the enemy, when John Wollaston cried out—'Up, boys; they are making a rush.' Each man rose at the word, and a hand-to-hand contest ensued which beggars all description. It was at this juncture that our revolvers did the work, as was afterward shown. Again the dust rose in blinding clouds, hurried up by the tramping feet of contending men. We stood as much chance to be shot by each other as by the savages. The quick rattling of pistols was heard on all sides, but the actors in this work of death were invisible. The last charge of my second pistol had been exhausted; my large knife lost in the thick dust on the road, and the only weapon left me was a small double-edged, but sharp and keen, dagger, with a black whalebone hilt, and about four inches long on the blade. I was just reloading a six shooter, when a robust and athletic Apache, much heavier than myself, stood before me, not more than three feet off. He was naked with the single exception of a breech-cloth, and his person was oiled from head to foot. I was clothed in a green hunting frock, edged with black, a pair of green pants, trimmed with black welts, and a green, broad-brimmed felt hat."

The description of the personal encounter is quite thrilling, the Apache having got the explorer down. He was saved from death only by being able, as the Apache thrust at him with great force, to so move his body as to cause the descending knife to bury itself deep in the ground. Before the savage could recover himself, he was dead, Cremony having succeeded in stabbing him with the dagger described. He continued:

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* Life among the Apaches, pages 135-6.

"About the same time the battle terminated with the defeat of our assailants, who lost ten killed and several wounded: how many we never knew. On our side, we lost one man—James Kendick—and had three wounded, viz: John Wollaston, John H. Marble and Theodore Heuston. Heuston and Marble died of their wounds soon after reaching Tucson, although they received the kindest nursing and attention from that noble Castilian gentleman, Juan Fernandez, and his amiable family. This sad result broke up the party, and I returned to San Diego shortly afterward with a party of immigrants coming to California."

Among the earliest of scientific explorers who with Poston commenced the work of mining, was Herman Ehrenberg, a civil engineer and a scientist of more than ordinary reputation and ability. He remained in the territory while Poston visited Washington City, and returned across the plains of Texas in the spring of 1856, with a colony of Americans and Germans, who settled at the old Presidio of Tubac, on the Santa Cruz River, and engaged in working the silver mines in the Santa Rita Mountains, Arivaca, the Cerro Colorado, and elsewhere in the southern portion of the territory. Ehrenberg was no ordinary man. Arriving here at an early age, he had worked his way to New Orleans, where he was located when the Texas war summoned him with others to activity. He enlisted in the "New Orleans Grays," and was present at the battle of Goliad and Fanning's defeat, and was one of the few who survived the barbarous massacre of prisoners who surrendered to the Mexican authorities. At the close of the Texan struggle he returned to Germany, and wrote an account in his native language of that interesting period, giving much information of the new country, which has induced a large emigration of Germans to Texas. He afterward returned to the United States, and in 1840, at St. Louis, joined a party which crossed the continent to Oregon. Thence he went to the Sandwich Islands, and after wandering in Polynesia for a few years, returned to California in time to join Colonel Fremont in the effort to free California from Mexican rule. He remained in California until the new purchase from Mexico attracted his restless nature, and after a long and arduous service in Arizona, fell a victim to the treachery of the aboriginal race at Palm Springs, in the southern part of California, where he is buried. The town of Ehrenberg was laid out by and named after him.

Poston's company attracted capital to the extent of nearly a million dollars in the development of the mines they had discovered, and were in a successful condition of exploitation, when, in 1861, the exigencies of the civil war caused the withdrawal of the troops of the United States, and the temporary abandonment of the territory. Raphael Pumpelly is another savant whose relations to Arizona were of an honorable and valuable character.

A company was started from San Francisco in the autumn of 1854, under the superintendence of Edward E. Dunbar, to work the "Ajo" copper mines in the Papagueria, near the Sonora line, and many of the "Ajo" Company remained in Arizona. The leader died at Pernambuco, in 1868, and is buried on the Island of Flores, on the coast of South America.

Among the more interesting and exciting episodes of the anti-bellum period, was that of the ill-starred Crabb expedition. In 1856 Gandara was the legally elected Governor of Sonora. Pesqueira pronounced against him. Henry A. Crabb was married to a member of the Ainsa family, of Sonora. While on a visit to his wife's relations, he met Pesqueira, since Governor of that State, who proposed to him to bring down a force of 1000 armed Americans to help him wrest the government from Gandara. Crabb's reward was to be a broad strip of territory across the northern frontier of Sonora. The pretext to palliate this gift of land to the Republic and the people was to be that the land was given to the American "colonists" in consideration of their protecting the border from Apache incursions. Crabb raised his men in California, and at once marched via Yuma and Filibuster's Camp on the Gila, (so named from his stopping there to recruit his animals, etc., prior to crossing the desert of Sonorita) with an advanced guard of 100 men. Meanwhile Pesqueira had driven out Gandara, secured the State government, and had no use for Crabb. His enemies preferred charges of treason against him for inviting foreign combatants into Mexican territory. Pesqueira stoutly denied all complicity with Crabb; roused the State against him; beseiged him at Caborca, and when Crabb's ammunition was exhausted and the building on fire in which he was intrenched and more than half his men were killed or wounded, secured his surrender without arms on promise of immunity and safe conduct to Arizona. Every man of Crabb's party was then butchered, and Pesqueira caused Crabb's head to be sent to the city of Mexico, in evidence of his own sincerity and loyalty. The nine hundred of Crabb's party, learning of his death, never completed their organization. A party of twenty-seven Americans started from Tucson to Crabb's relief, but arrived late and had to fight their way back against overwhelming numbers. Grant Ourey and Charles Tozer were among the twenty-seven. The latter gentleman is among the best known mining experts and public men on the Pacific Coast. He is a man of fine culture and wide experience, especially notable for never having surrendered the courteous habits and manners which betoken the cultivated gentleman. He is a citizen of Nevada, and was Speaker of the House in the first State Legislature. Mr. Tozer was an intimate friend of Crabb, and declares that the expedition was undertaken strictly within the law, and did not belong to the filibustering category. Crabb was first invited by Pesqueira, by letter, to organize a colony, Mr. Tozer himself being a party to the correspondence. He did not go into the movement, and went to Tucson on business. On receiving news from Crabb of his sad plight, Tozer raised twenty-six men, and having himself equipped and mounted them at his own expense, started to Crabb's rescue. It was too late. Tozer's party had several fights, the last being about eight miles from the line, in Sonora.

The following documents, (translated by G. D. Tyng, Esq., editor of the *Yuma Sentinel*) have not been heretofore placed in a permanent form. Crabb, on arriving at the frontier, sent the following letter forward. It was published as shown:

La Voz de Sonora; URES, March 30th, 1857. Supplement to No. 61.

"SONOITA,* March 26th, 1857.

"*To Mr. José Maria Redondo,*

Prefect of the Department of Altar:

"In conformity with the colonization laws of Mexico, and upon positive invitation of some of the most influential citizens of Sonora, I have come within the lines of your State, accompanied by one hundred companions and in advance of nine hundred others, with the expectation of finding happy homes with and among you. I have come without intention of injuring any one; without intrigue, public or private. Since my arrival at this place, I have given no indication of sinister purposes, but on the contrary have made only friendly propositions. It is true that I am provided with arms and ammunition; but you well know that it is uncommon among Americans or any other civilized people to travel without arms; besides that, remember that we have been obliged to pass through a country continually harassed by Apache depredations; and from circumstances, I imagine, to my surprise, that you are taking hostile measures against us, and are collecting a force for exterminating me and my companions. I am well aware that you have given orders for poisoning the wells, and that you are prepared to resort to the vilest and most cowardly measures against us.

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*This Sonoita is on the boundary south of the Ajo mine, near the intersection with boundary of line between Yuma and Pima counties.

"But have a care, sir: for whatever we may be caused to suffer shall return upon the heads of you and of those who assist you! I had never considered it possible that you would have defiled yourselves by resorting to such barbarous practices. I also know that you have endeavored to rouse against us our very good friends, the tribe of Papago Indians; but is is most probable that, in the position I hold, your efforts will fail. I have come to your country because I have a right to follow the maxims of civilization. I have come, as I have amply proved, with the expectation of being received with open arms; but now I believe that I am to find my death among an enemy destitute of humanity. But, as against my companions now here, and those who are to arrive, I protest against any wrong step. Finally, you must reflect; bear this in mind: if blood is shed, on your head be it and not on mine. Nevertheless, you can assure yourself and continue with your hostile preparations; for, as for me, I shall at once proceed to where I have intended to go for some time, and am ready to start. I am the leader, and my purpose is to act in accordance with the natural law of self-preservation. Until we meet at Altar, I remain

"Your ob'dt serv't,

"HENRY A. CRABB."

"This communication is given to the Warden of Sonoita, to be forwarded to the Prefect of Altar, without fail or delay.

"H. A. C.

"A true copy of the original translation. Altar, March 28, 1857. JOSE M. REDONDO.

"URES, 1857. Government Printing Office, in charge of Jesus P. Siqueiros."

Governor Pesqueira, the treacherous, then issued the following:

PROCLAMATION.

"IGNACIO PESQUEIRA, *Substitute* Governor of the State, and Commander in Chief of the forces of the Frontier; To his Fellow Citizens:*

"Free Sonorians, to arms, all ! !

"Now has sounded the hour I recently announced, in which you must prepare for the bloody struggle you are about to enter into.

"You have just heard, in this most arrogant letter, a most explicit declaration of war pronounced against us by the chief of the invaders. What reply does it merit? That we march to meet him.

"Let us fly, then, to chastise, with all the fury that can scarcely be contained in a heart swelling with resentment against coercion, the savage fillibuster who has dared, in unhappy hour! to tread our nation's soil, and to arouse, insensate! our wrath.

"Nothing of mercy, nothing of generous sentiments for this canaille!

"Let it die like a wild beast, which, trampling upon the rights of men and scorning every law and institution of society, dares invoke the law of nature as its only guide, and to call upon brute force as its chosen ally.

"Sonorians! Let our reconciliation be made sincere by a common hatred for this cursed horde of pirates without country, without religion, without honor. Let the only mark to distinguish us and to protect our foreheads, not only against hostile bullets, but also against humiliation and insult, be the tricolored ribbon, sublime creation of the genius of Iguala.

"Upon it let there be written the grand words 'LIBERTY OR DEATH,' and henceforth shall it bear for us one more significance; the powerful, invincible union of the two parties which have lately divided our State in civil war. We shall soon return all loaded with glory, after having forever secured the prosperity of Sonora, and established, in defiance of tyranny, this principle, THE PEOPLE THAT WANTS TO BE FREE, WILL BE SO. Meanwhile, citizens, relieve your hearts by giving free course to the enthusiasm which now burdens them.

"LIVE MEXICO! DEATH TO THE FILLIBUSTERS! IGNACIO PESQUEIRA.

"URES, March 30, 1857.

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*Pesqueira was substituted, by revolution, for the elected Governor, Gandara.

"URES, 1857. Government Printing Office, in charge of Jesus P. Siqueiros."

No other filibustering attempt was made until some time in 1860, when a small affair evoked excitement. The Mexicans retaliated when our civil war afforded an opportunity. A daring Opate Indian led several hundred followers over the line.

But to return to the general history. The first American machinery was introduced into the Santa Cruz Valley for use at the famous Cerro Colorado or Heintzleman Mine. Mining settlements, very sparse and feeble, began in Mojave County during 1857. Efforts were made to secure civil government about this time. No courts had been organized, and Santa Fé was a long distance. Yuma, under the name of Arizona City, was laid out in 1854. A paper, under the name of *The Arizonian*, was published for a short time in Tubac, during 1859 or 1860. Attempts to organize a territorial government were made in Congress as early as 1857. Mr. Gwin, of California, introduced a bill in the Senate to organize the Territory of Arizona; but there were jealousies on the railroad question, which resulted in the defeat of the bill. Mr. Green, of Missouri, in 1860, introduced a bill to provide a "temporary government for the Territory of Arizuma," which also failed. Various other attempts were made, none of which were successful. During the year last named, a movement began at Mesilla, New Mexico, to make a separate territory. Under it Sylvester Mowry, well known as an army officer and owner of the Mowry Mine, in the Pategonia Mountains, was chosen delegate, though he was never admitted to a seat in Congress. The author of "The Marvellous Country," Mr. Cozzens, was a party to this movement. A convention was held at Tucson, in which several well-known citizens of the place were concerned. J. Ross Browne, in his valuable work, "Adventures in the Apache Country," gives a graphic picture of affairs at this period, as will be seen by the quotation:

"The rebellion broke out in April, 1861. The Butterfield overland mail line was stopped at the same time, in view of the dangers that threatened it; and an Act of Congress was passed changing the route.* During the month of July the only Federal troops in the territory shamefully and without cause abandoned it, and marched from Forts Breckenridge and

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*Commanded by Captain Ewell, afterwards a Confederate Lieutenant-General.

Buchanan to Cook's Springs, when they heard the Texan rebels were coming. Without waiting to ascertain the number or prepare for any defense, they burned all their wagons, spiked their cannon, and packed their provisions on mules over the mountains to Fort Craig. There were four companies, numbering altogether 450 men. They had heard of the surrender of Fort Fillmore, toward which they were marching, and this caused them to take a different route. At Fort Fillmore 500 Federal troops of the regular army surrendered to about 250 renegade Texans, ragged, undisciplined, poorly armed and badly equipped. A scattering company of these roving bandits, under the command of the guerrilla chief, Captain Hunter, numbering about 100, reached Tucson on the 27th of February, 1862, and took possession of the place. Most of the inhabitants had fled to Sonora for safety, or stood ready to join the rebels. Hunter and his party held possession of the territory, advancing as far as the Pimo villages, and even threatening Fort Yuma, till the advance of the California column in May, when they retreated to the Rio Grande. The few citizens and traders who remained loyal to the Government, and the managers and workmen employed at the mines, being thus left at the mercy of lawless desperadoes, roving bands of Apaches and Sonoranians, fled from the country as fast as they could procure the means of escape. Many of them were imprisoned, and some were murdered. The hostile Indians, ignorant of our domestic disturbances, believed they had at length stampeded the entire white population. On the public highways they fell upon small parties and slaughtered them. It was their boast, and is still their belief, that they had conquered the American nation. The Sonoranians, greedy for plunder, rushed in from the borders by hundreds, and commenced ransacking the mines, stealing the machinery, and murdering the few employees that remained. At Tubac, the head-quarters of the Arizona Mining Company, the Apaches besieged the town on one side, while the Sonoranians lurked in the bushes on the other. Twenty men held it for three days, and finally escaped under cover of night. There was nothing left. The troops had burned all the stores, provisions and groceries, public and private, that they could lay hands upon; torn down the mill at Tucson; burned the Canoa; and destroyed government stores at Breckenridge and Buchanan, amounting in value to half a million dollars."

Nothing remained of Union rule until 1863, when it was reestablished. A few American miners held on to their locations in the Cerbat and Haulapai Mountains. In the Salt River Valley there was a ranch or two; and elsewhere, except at Tucson and Yuma, there was nothing of life to be found except a few Mexicans, the Pimas and Papagoes, with the hostile Indians at every turn.

At last Congress was forced by military necessity to turn its attention to this region—in which the Gila Valley forms the only open roadway from the south-west to the Pacific. On the 24th of February, 1863, the organic act was passed. Under it the following officers were appointed by President Lincoln:

John N, Goodwin, of Maine	Governor
R. C. McCormick, of New York	Secretary
Wm. F. Turner, of Iowa	Chief Justice
Wm. T. Howell, of Michigan	Associate Justice
Joseph A. Allyn, of Connecticut	Associate Justice
Almon Gage, of New York	District Attorney
Levi Bashford, of Wisconsin	Surveyor-General
Milton P. Duffield, of California	Marshal
Charles D. Poston, of Kentucky	Sup't of Indian Affairs

The civil officers thus appointed—with the exception of Colonel Poston, who went to California and entered on his bailiwick and its duties by way of Yuma—set out via New Mexico. The Territory of Arizona was formally organized on the 29th of December, 1863, at Navajoe Springs, forty miles north-west of the famous Zuni pueblo. Richard C. McCormick, now Assistant Secretary of Treasury, acting as Secretary of the Territory, on raising the flag which announced the sovereignty of the Union, made the following speech:

" *Gentlemen:*—As the properly qualified officer, it becomes my duty to inaugurate the proceedings of this day. After a long and trying journey, we have arrived within the limits of the Territory of Arizona. These broad plains and hills form a part of the district over which, as the representatives of the United States, we are to establish a civil government. Happily, although claimed by those in hostility to the Federal arms, we take possession of the Territory without force. The flag which I hoist in token of my authority is no new and untried banner. For nearly a century it has been the recognized, the honored, the loved emblem of law and order. From Canada to Mexico, from the Atlantic to the Pacific, millions of strong arms are raised in its defence; and above the efforts of all foreign and domestic foes, it is destined to live untainted and untarnished."

The party remained at the Springs but a short time, and then moved westward, until, early in the year, they reached the lovely site of the little city of Prescott. Here their tents were pitched, and shortly after Secretary McCormick commenced the publication of the *Arizona Miner*, a journal which has been issued ever since. The history of the Territory from 1864 down to the year 1875 has been one of slow growth and fierce struggle. The Apaches and Hualapais Indians have been brought into subjection, and the Yumas are—well, the process of civilization (?) does not need particularizing. The capital was removed to Tucson for a while, and during the year 1877 it was removed back. The Territorial Governors have been John A. Goodwin, Levi Bashford and A. P. K. Safford — the latter of whom served over six years. Charles D. Poston was the first delegate to Congress. He was succeeded by Richard C. McCormick, who retained his position until 1875–6, when he was succeeded by Mr. Stevens, who is now serving in Congress. Florence was started not a very great while before. The census of 1870 gives the following distribution of population:

MOJAVE COUNTY.

Name of Place.	*Population.*
Hardyville	20
Mojave City	159

PIMA COUNTY.

Adamsville*	400
Apache Pass	400
Calabasas	62
Casa Blanca	52
Cerro Colorado	58
Crittenden Camp	215
Florence*	218
Goodwin Camp	200
Grant Camp	840
Mariposa Wells†	68
Rieletto	82
Saguano	71
San Pedro	80
San Xavier	118
Tubac	178
Tucson	3,224

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* These places are now in Pinal County. † This in Mariposa.

YAVAPAI COUNTY.

Big Bug and Lynx Creek	96
Tollgate and Walnut Grove	107
Chino and Lower Granite Creeks	80
Date, Kirkland and Skull Creeks	90
People's Valley, etc	45
Prescott	668
Rio Verde	174
Salt River Valley†	240
Vulture Works	155
Vulture Mine	133
Walnut Grove	40
Wickenburg†	174
Williamson Valley	160

YUMA COUNTY.

Yuma	1,144
Ehrenberg	233
La Paz	254

The County Assessor's enumeration in 1872 was as follows: Counties—Pima, 3,652; Yavapai, 3,539; Yuma, 1,643; Maricopa, 1,156; Mojave, 753; making a total of 10,743.

The enumeration made in 1875-6 gives the following figures: Yavapai, 13,661; Pima, 8,117; Maricopa, 3,702; Yuma, 2,212; Pinal, 1,602; Mojave, 822; total, 30,114.

The present population is estimated at or near 36,000. When the territory was organized, the population, exclusive of Indians, was stated at 581.

The Legislature, at its earlier session, organized the counties of Pima, Mojave, Yavapai and Yuma. At a later date they organized those of Maricopa and Pinal. Among the earlier acts was the adoption of an excellent common-school law, with a compulsory attendance feature. This is the work of the late Governor, A. P. K. Safford. Arizona may boast of the best public schools of any of the territories, and also of the fact that her people contribute largely, so that the expenditure per capita is the highest in the Union. The territory has also an excellent code of laws.

The principal events in the history of Arizona, since the reëstablishment of the national authority, in 1864, have been those connected with the subjugation of the Apaches. This work was not fairly commenced until the appointment to command of General Crook, or rather, to be more just, to the appearance of Gen. O. O. Howard, as Special Indian Commissioner. In Arizona itself, the only comment, as a rule, is that of bitter hostility, not alone of the aborigine, but of all who have adopted or advocated any means other than those of destruction to bring about peace. Whatever else may be said of Gen. Howard, it must also be acknowledged that his policy was the first successful breach in the long and unbroken line of savage warfare. It brought Cochise to terms, so far as the Americans were concerned. The appointment of Gen. Crook to command, and the unrelenting warfare he waged, soon made other bodies of Apaches surrender. Crook adopted the policy of dividing his foes by employing them to fight one another. Under this policy a considerable number of Apache and Hualapais Indians have been used as scouts, and the Indian Agent at San Carlos still keeps a number of them as an armed police. The Apaches were, under Gen. Howard's policy, first congregated on the Chiricahui Reservation, occupying the southeastern portion of the territory. The unwise nature of the location was soon exemplified by the Indians making it a base of operations for attack on the people of Sonora. Gen. Crook removed the savages to the White Mountains Reservation, north of the Gila River, where they are now located. Since the severe chastisement given by Crook to the Tonto Apaches and others, there has been no general Indian marauding; but for a long period, and up to last spring, the New Mexican line and the Chiricahuas were rendered unsafe by small parties of renegades—Indians who slipped off the Arizona or New Mexican reservations and went on predatory raids, generally following the valley of the Rio de Sauz, in the Chiricahui mountain region, or that of the San Simeon, down to the Sonora line. They would plunder and murder on either side of the New Mexican line, carry their plunder into Chihuahui or Sonora, trading it off with the Lipans or Mexicans, and then start back, passing into Arizona by the San Pedro or Santa Cruz pecertas, plundering, raiding and slaying, on their way back to San Carlos. This condition of affairs has almost entirely ceased. It ended, so far as the Santa Rita and San Pedro regions are concerned, in the spring of 1877, when a new era slowly but surely began to dawn upon this wonderfully rich but undeveloped frontier region; this territory, the oldest in civilization to all appearance of the vast continental area embraced by the American Union, but almost the newest and least advanced of any of our organized communities as inchoate States.

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† These places are now in Maripona County.

CHAPTER III.

PHYSICAL AND GEOLOGICAL FEATURES.

THE TOPOGRAPHY OF ARIZONA. PROFESSORS BLAKE AND PUMPELLY. MOUNTAIN RANGES. THE LAVA FIELD. CONES AND PEAKS. THE GRAND PLATEAU. ITS GEOLOGY. DR. NEWBERRY'S WORD PAINTING. THE CAÑON SYSTEM OF THE COLORADO. MAJOR POWELL, THE EXPLORER. VIVID DESCRIPTION. NAVIGATION. THE GILA, COLORADO-CHIQUITO, ETC. A TOPOGRAPHICAL BOND OF UNITY.

Arizona, physically considered, consists of a series of wide plateaux, generally having a mean elevation of from but 60 to 100 feet on the south-west, up to 6,000 and 7,000 feet above sea-level in the north. These plateaux are crossed by mountain ranges, while magnificent peaks diversify the prospect. They are riven in all directions by great cañons, vast gorges, deep channels, cut by the streams and rivers which, since the mysterious Archæan ages, have been forcing their way through this huge mass of mountain formation. Nowhere else can the operations of world-making be observed with more distinct and positive clearness than in the geology and physical character of the larger portion of this Territory. Professor J. D. Whitney thus sums up, and inadequately, too, the general aspect of the region:*

"From Mexico, the system of the Cordilleras enters our Territory still widening and gaining in perplexity. Just above the southern border of Arizona, along the parallel of 33 deg., occurs the greatest depression of the Cordilleras existing north of southern Mexico; here the continent may be traversed without rising to an elevation of over 4,000 feet. The country along this line is a table-land, with many short and broken ranges of no great altitude built upon it, but deeply excavated by numerous cañons, * * of which that of the Colorado River may be taken as a type. On this plateau, in latitude 35 deg., there is a transverse east and west line of volcanoes, similar to that which traverses Mexico; these grand volcanic cones, of which the

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* Physical Aspects of the United States. Statistical Atlas, 1874.

San Francisco Mountain is the loftiest and best known, rise to nearly double the altitude of the plateau on which they are built up." * * "Lava plains of great length and breadth are found along the Gila River."

Professor Pumpelly describes the south-west portion of Arizona from the Sonora line to the Gila River, in the following terms: "Broad, gravelly plains, bearing only cacti, with here and there the leafless palo-verde tree and the never-failing greasewood bush. In the distance, on either side, arise high granite mountains, to which the eye turns in vain for relief; they are barren and dazzling masses of rock. On these vast deserts the sluggish rattlesnake meets the traveller at every turn; the most powerful inhabitant, his sway is undisputed by the scorpions and lizards, on whom he feeds. The routes over these wastes are marked by countless skeletons of cattle, horses and sheep, and the traveler passes thousands of the carcases of these animals wholly preserved in the intensely dry air. Many of them dead, perhaps for years, have been placed upright on their feet by previous travelers. * * These mummies, they seemed sentinels guarding the valley of death."*

Over the center of the arid plains thus described, there stretches, from north to south, a mass of lava about one mile wide, and extending southward as far as the eye can reach. On this lava wall stand two parallel rows of extinct volcanic cones 100 to 300 feet high, with craters. "In crossing this remarkable remnant of recent volcanic action," writes Professor Pumpelly, "one could look down the long and perfect vista of regular cones till they faded away in the perspective and behind the curvature of the earth."

Prior to the Wheeler expedition of 1873 it was not known that within the borders of Arizona and New Mexico there lies one of the great lava tracts of the world, a continuous area of volcanic products, second in magnitude in our country only to the great north-western lava field, and fifteen times as large as the classical district of extinct volcanoes in Central France. The geologists who have accompanied the various public and private railroad surveys have passed, on the thirty-second parallel, to the south of it, or on the route of the thirty-fifth parallel have missed the main body and touched only its extended arms. Messrs. Marcou and Newberry, who saw Mount Taylor and Mount San Francisco, two hundred and thirty-five miles apart, had no means of knowing that by a detour to the south they could pass from one to the other almost without walking on other rock than lava, and yet such is the fact. In the rectangle contained by parallels 32 deg. 45 min. and 34 deg. 20 min., and the meridians 107 deg. 30 min. and 110 deg., more than nine-tenths of the surface is of volcanic material; and from this main body there stretch two chief arms—the one going north-northeast eighty miles to Mount Taylor, and the other west-northwest, one hundred and seventy-five miles, in Arizona, to the San Francisco group of volcanoes. Its total area is more than twenty thousand and probably nearer twenty-five thousand square miles, or about half that of the State of New York. The portion embraced by Arizona is over one-half of the whole.

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*Across America and Asia.

An endeavor has been made by J. Richtofen, (article—a "Natural System of Volcanic Rocks," Proceedings California Academy of Sciences) to establish a correlation between the geological age and priority of volcanic rocks and their chemical and lithological nature. He considers the following to be their order of sequence, viz: propylite, andesyte, trachyte, rhyolite and basalt. Propylite and andesite are rarely seen on the Colorado plateau. The multitudinous varieties and intergradation of trachyte and rhyolite prevent ready discrimination in the field, and occasioned doubts of the validity of their separation; but with a single exception, at Truxton Spring, Arizona, basalt was everywhere seen, by members of the Wheeler expeditions, to overlie rhyolite and trachyte.

Arizona may be described as one of the most marvelous portions of the American continent, equaled perhaps, but not surpassed, by the wonderful Yellowstone region, whose striking features of mountain, chasm, geyser, and strange color-tones Moran's brush has made familiar. The western Sierras can be divided into three great divisions—the parks, basins and plateau. Lying between the Rocky Mountains on the east and the Sierra Nevada on the west, the transverse chains form great basins, of which that of the Salt Lake is the chief within the bounds of the United States. The park system is found chiefly in that portion of the Rocky Mountains embraced by a part of Wyoming and the whole of Eastern Colorado, reaching down along the north-west edge of New Mexico and extending over to the eastern portion of Arizona, where, at the head of the Gila, Rio Verde, Colorado-Chiquito, Puerco and Rio Francisco, several small parks, bowl-like gems of exquisite scenery, are found. Arizona exhibits the plateau system in its greatest features. One-half of the great Colorado plateau lies within its borders, occupying about two-fifths of its area. It forms an irregular triangle from the point where the Rio Colorado enters it to the north-west eastward nearly to the Rio Grande, and northward into Utah, falling away at the San Juan in Colorado and merging into the great ranges that form the Rocky Mountains. From the northern boundary line it stretches south, on the east as far as the Rio Gila, which breaks from and through its lower bench—the Mogollon. From its extreme southern point the outer edge of this massive range of almost continuous mountain trends to the north-west for nearly three degrees of latitude. Its southern and eastern point may be set down at 109 degrees of longitude. Its northern and western, within the territory of Arizona, at about 115 degrees. The Colorado plateau consists of three mountain benches, having an average altitude of from 4,000 to 6,000 feet above the sea, the surface of which is a comparative level, with occasional peaks and bluffs of strange fantastic forms and startling heights. This great formation is entered on the north by the Rio Colorado, which cuts its way westward through the mightiest of chasms and cañons. It is entered on the north-east edge by the Rio San Juan, forming a region famous now for its silver deposits, and it is also pierced by the Colorado-Chiquito, the Verde, the San Francisco, Salina, or Salt, and the upper forks of the Gila River. These rivers make more or less deep cañons and narrow valleys; the latter are adapted to stock and agriculture. The summits of the plateaux in many places furnish nutritious food for stock.

The mountain ranges of Arizona make one of its most remarkable features, rivalling even in the grandeur of their formation the wonderful cañon system which finds in the course of the Colorado, the Gila, and the Colorado-Chiquito the most magnificent of illustrations, with regard either to the mighty forces that have been and still are at work to produce them, or the amazing majesty of scenery which they display. From the Rio Grande to the Colorado the whole country presents the character of a vast upland, crossed by a succession of mountain ridges and basin-shaped valleys, interrupted by the product of recent volcanic eruptions in the form of extinct craters, cones and streams of lava, which have overflowed and buried up the lower sedimentary rocks. The principal mountains exhibit a granite nucleus, which at certain points is exposed to view in irregular ranges, constituting the general frame-work of the country. Intermediate to these is the great table-land or *mesa* formation of western New Mexico and eastern Arizona, comprising the sedimentary strata of triassic and cretaceous rocks, which spread out into broad uplands, abruptly terminated by steep mural declivities, bounding valleys of erosion, or presenting isolated buttes and fantastically castellated rocks that serve to give a peculiar aspect to the scenery. The principal foci of extinct volcanic action in Arizona is represented by the San Francisco cone, attaining an elevation of over 12,000 feet above the sea, whose alpine slopes, reaching above the water line, present in its covering of snow the chief wintry feature pertaining to this latitude. The chief ranges are the Peloncillo, the Pinaleno, the Santa Catarina, the Santa Rita, the Dragoon and the Chiricahuas, in the south-east; a low range along the north bank of the Gila, the Mogollon and the White Mountains on the east; between the Gila and Little Colorado, the Zuni Mountains, the larger portion of which lie in New Mexico; the San Francisco range and peak in the north; the several sierras that girdle in Prescott and extend north and east of that point; the Peacock, Cerbat and Hualapais ranges in the northwest; and the Castle Dome Mountain in the vicinity of Yuma. To enter into a description of these ranges—all the great physical features of Arizona—would require a volume of itself. There are many striking peaks, large and small, and isolated formations of singular massiveness and picturesque beauty. Some of them attain a great altitude.* Among these, besides the master cone—the San Francisco Mountain—are to be mentioned Mt. Graham, Mt. Wrightson, Sugar Loaf Peak, the Tucson, Picacho and Superstition mountains, Mt. Sitgreaves, the Baboquivari Peak, the Blue Peak, Mt. Turnbull, Mt. Kendricks, Thumb Butte at Prescott and Music Mountain, with others as notable. Lieutenant Ives, in the report of his famous expedition of 1854, named a peak, near the Colorado River, on the north-west, "Music Mountain," because the regularity of the strata of which it is composed and the singular erosive work on their face give it the distinct appearance of a huge sheet of music, carved on the mountain's face by the cunning hands of the Divine composer, through the agencies of wind and water, leaving there a score that awaits only the thunderous voice of nature herself to evoke vast harmonies for the listening world.

The mountain ranges there have generally a north-west and south-east course. Long, narrow valleys lie between them. The Mogollon extends east and west. The axis of the Black Mountains and of the Cerbat range to the north-west is nearly south and north; so also with the Santa Rita, Alascoso, the Baboquivari, the Dragoon, the Patagonia, Chiricahuas and other ranges in the Gadsden purchase region south of the Gila River. The ranges that enclose that stream, "river of the swift" as the Spaniards termed it, are almost due east and west; so also with those through which the Salt River in part forces its way. In central Arizona the Sierra Prieta sends out foothills in every direction, its flanks sinking north-east to the volcanic plateau of which the Francisco mountains is the center, and on the south and west towards the Colorado. In the northern portion there is a notable plateau, elevated about 1000 feet above the rest of the great formation, which is known as the "Mesa de la Vaca," or table-land of the cows. The geological formation of these mountains is principally granitic. In the more western ranges there are indications of gneiss and of talcose, micaceous and clay slates. The valleys and mesas between the several ranges generally consist of the detritus of these mountains, thus indicating that they underlie the surface of the country. It is this peculiar formation which justifies Dr. Newberry's declaration that "Arizona is over-drained." The valley of the Colorado and its tributaries drain the whole region. Lieutenant Wheeler in a recent report on the geology of his explorations, writing of the Colorado, says: "The simplicity of its structure, the thoroughness of its drainage, which rarely permits detritus to accumulate in its valleys, its barrenness, and the wonderful natural sections exposed in its cañons, conspire to render it indeed "the paradise of the geologist." There he can trace the slow lithological mutations of strata continuously visible for hundreds of miles; can examine, in visible contact, the strata of nearly the entire geological series, and detect every nonconformity, however slight, and can study the simpler initiatory phases of an embryo mountain system." Professor W. P. Blake, the geologist, thus describes its principal features: "In the broad region drained by the Colorado and its tributaries, the carboniferous, together with older divisions of the paleozoic, and the later formations of mesozoic time, are comparatively undisturbed, and form a broad plateau region of nearly horizontal strata through which the streams have cut their way and expose unbroken sections of the whole series of rocks from the early silurian, resting upon the eozoic, to the tertiary surmounted by volcanic outflows. The Mogollon mountains of Arizona mark the southern limits of the plateau region, beyond which the formations are uplifted, and extend in parallel ranges south-eastward into Mexico." The Colorado plateau is believed to have been covered in part by an archaic ocean, until the close of the carboniferous age, receiving its deposits from the adjacent continent to the south and west. It then became the bed of an inland sea, so remaining during the two following geologic periods. This again was replaced by a shallow ocean, while the "basin range" adjacent became continental in character. The cretaceous sea or bay became a lake, and was gradually drained by elevation.

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*See Table of Altitudes in the Appendix.

In the "Wheeler Report," for 1876, the following description of the pre-historic ocean is given:

The record of its advance "has been traced as far west in Nevada as longitude 117 deg., and as far east as longitude 109 deg.," and there is no reason "to doubt its continuity beneath newer strata, to the region of the Great Lakes. * * * From the close of the carboniferous to the beginning of the cretaceous age, a great area, including the whole plateau country, appears to have been covered by an inland sea, entirely separate from the ocean; a sea in which were accumulated, probably from local sources, minerals that the world-wide ocean, constant in its generalities, cannot be supposed to have furnished in such quantity. The deposits are pervaded by gypsum, and colored by the peroxyde of iron, and contain no indigenous fossils, only logs and leaves drifted from the shore. Once only did the ocean retain temporary sway, bringing with it a jurassic fauna, and then retreating; until, in cretaceous time, the domain of the shut sea was finally abolished. Through the cretaceous age the plateau country was the scene of a shallow ocean, the shore of which crossed and recrossed it, and was never remote; while the Range province had become finally continental. Then, by the uprising of some remote barrier, the cretaceous sea, or bay, was converted into a fresh lake; and with the gradual drainage of this the whole region became terrestrial. Since the expulsion of the sea, the elevation of the continent which caused it has continued; and the plateau region which, from early silurian to late cretaceous, sank (as referred to the ocean) no less than 8,000 feet, has been bodily uplifted to its former altitude. Erosion, which began in the ranges and the plateaux, as they were successively exposed to the atmosphere, has labored during the elevation to remove the results of the deposition which accompanied and recorded the subsidence, but has accomplished only a small fraction of its task."

From the graphic pen of Dr. J. S. Newberry, the well-known savant and explorer, the following word-painting is taken:

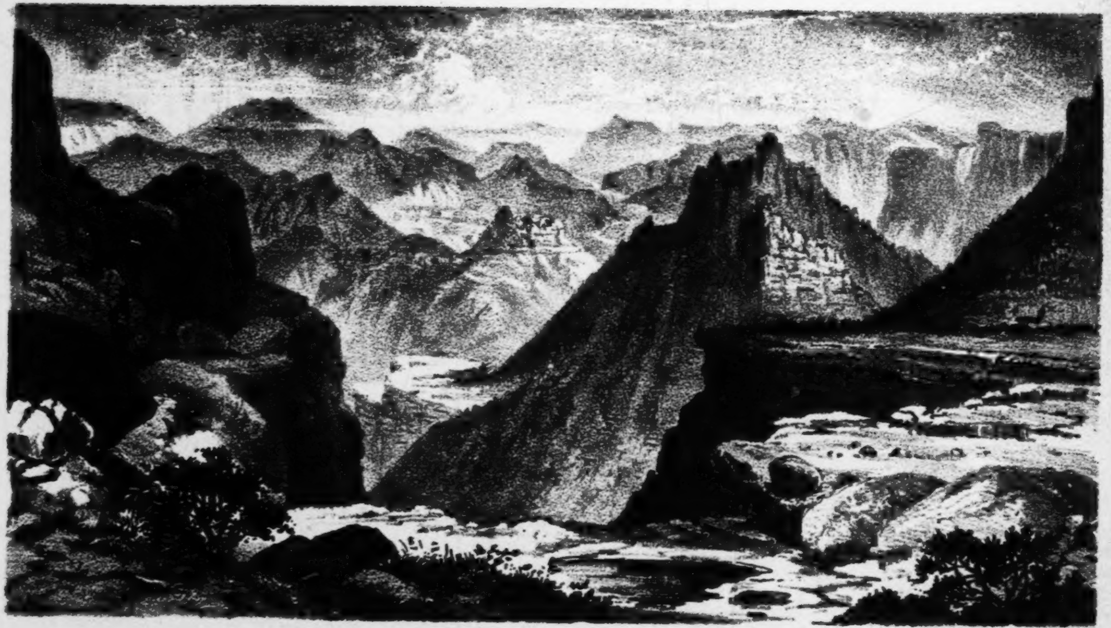
"Could one be elevated to a sufficient height over the centre of this region, and be gifted with superhuman powers of vision, he would see beneath him what would appear to be a great plain, bounded on every side by mountain ranges, and here and there dotted with isolated mountain masses, rising like islands above the surface. He would see the profound chasm of the Colorado Cañon, scoring with tortuous and diagonal course the plain, through the entire length of its greatest diameter; for nearly five hundred miles the stream flowing from 3,000 to 6,000 feet below the general level, and at nearly all points bordered by abrupt, frequently perpendicular, crags and precipices. Most of the surface beneath him he would perceive to be arid and desert-like; barren wastes of rock and sand; nowhere continuous forests, or carpets of herbaceous vegetation; only here and there dwarfed and scattered pines and cedars, and threads of green along the streams; the surface marked with long lines of mesa walls, the abrupt, often vertical sides of broad valleys of erosion; over considerable areas the denudation of soft materials, of varied and vivid colors, having fretted the surface into wonderfully truthful imitations of Cyclopean cities, crumbled by time, or devastated by fire, giving double force to the sense of desolation which the scene inspired." * * * * It would present "the wreck and ruin of a region rich and beautiful, changed and impoverished by the deepening channels of its draining streams," giving to the explorer and traveller "the most striking and suggestive example of over-drainage of which we have any knowledge.

"To prevent misapprehension, it should be stated that around the margins of the Colorado plateau, at the immediate bases of the mountains, the traveller will behold many scenes of beauty and fertility, strikingly in contrast with the aspect of the country nearer the river." * * * His eyes will rest upon "regions of green and flowery mountain valleys; of clear, cold and copious streams; of magnificent forests; with an atmosphere of unrivalled purity, and a climate delightfully tempered. Here, too, are the mineral treasures of which the sedimentary rocks of the plateau furnish almost none; and here will be congregated the mining population, whose business it will be through future ages to extract for our use the mineral wealth with which many of the mountain ranges are stored."

The line of cliffs which form the southern boundary of the plateau system are carboniferous; and that portion of the plateau comprised in this formation is 180 miles in extreme breadth, from the mouth of Paria Creek south-west to Aubrey Valley; and its length, in a right line, is over 300 miles. Through it the Colorado has cut the Marble Cañon, and the upper part of the Grand Cañon. Upon it stand the peaks of San Francisco, Bill Williams, and other conspicuous mountains. From the vicinity of Camp Apache, on the east, to the Colorado, at Diamond Creek, on the west, the line of these cliffs is almost continuous, and in its general course direct. The general slope of the plateau from this cliff is downwards to the northward, until another line of cliffs is reached, belonging to triassic formations. The south-westerly limit of these latter formations is approximately represented by a line beginning near St. George, Utah, passing east, and a little south, for 130 miles, to the Colorado River at Monument Cañon, expanding in the middle of this course to a width of 35 miles, and thrown 25 miles to the north by the Kaibab plateau. It crosses the Colorado at Monument Cañon, runs south-east to the Colorado-Chiquito, (Little Colorado) where, turning more to the east, it follows that stream nearly to its head, and finally disappears beneath the lavas of the Mogollon region, 200 miles southeast of Monument Cañon. When not interrupted by the Colorado-Chiquito, its mural escarpments—cliffs of heavy sandstone—overlook at the southwest a broad floor of carboniferous limestone that reaches nearly or quite to the western limit of Yavapai County. The carboniferous, the triassic, jurassic, and the cretaceous are the main formations of the Colorado plateau in Arizona, excepting the volcanic mountains. Here and there, however, are small local areas of other formations. Nothing corresponding to the permian strata appear to have been yet discovered; no devonian rocks have been clearly identified, and the silurian is meagrely represented.

Major J. W. Powell, in his "Geology of the Uintah Mountains," in reference to the plateau system, expresses the following views:

"By a combination of circumstances, the whole region is an open book to the geologist. * * * * Accumulations of sediments may be studied" of different geological ages, "each represented by formations that are measured by thousands of feet * * * * A general section of the sedimentary beds alone sums up a total of nearly 60,000 feet, and the relations of the groups into which they can be divided can be determined with a certainty rarely attainable in the eastern portion of the United States. * * * * But a section thus ar-



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THE GRAND CAÑON OF THE COLORADO.

ranged, (on a basis of stratigraphical peculiarities as observed on the plateaux) presents a series of limestones, shales, sandstones, and conglomerates totally unlike that which has been established in the New York and Appalachian province, or in the Valley of the Mississippi. Again, in several of the groups we discover the remains of rich faunas and floras; but the series of fossils belonging to any of the natural groups in the plateau province is unlike that of any group or formation in the earlier studied rocks of the East; either entirely new series are found, or the old types are re-grouped so as to present a new aspect. * * * * The conclusions thus stated have been reached after a study * * * which has occupied the greater part of the last eight years."

Major Powell divides the carboniferous series as found in the plateau region into the Upper Aubrey, Lower Aubrey, Red Wall and Tonto groups. The Upper Aubrey, at the Grand Cañon, is 775 feet in thickness, and consists of limestones, sandstones, gypsiferous sandstones and gypsum. The Lower Aubrey group, in the same locality, consists of bright-red sandstones to a thickness of nearly 700 feet, and red and buff sandstones, with irregular and inconstant beds of limestone, of 600 feet. The Red Wall group consists of a great number and variety of beds, aggregating about 2,000 feet in thickness, comprising in succession, commencing at the top, limestones and calciferous sandstones, massive granular limestone, friable greenish sandstones, purple sandstones, thinly-bedded cherty limestone, gray and buff sandstones, heavily-bedded limestones, with calciferous sandstones at summit; thinly-bedded, concretionary, brecciated limestones; greenish, micaceous shales, with beds of brown sandstone, containing iron concretions; these last being the base of the series. This group constitutes the most conspicuous feature of the Grand Cañon of the Colorado and its tributary gorges, often standing in vertical walls of 2,000 feet or more, and is everywhere carved into a series of amphitheatres. The Tonto group consists of: 1st, limestones and a good marble, 75 feet in thickness; 2nd, rust-colored sandstones, 600 feet; 3rd, brown sandstone, 100 feet. Mr. Gilbert, geologist to the Wheeler Expedition, considers this group to be lower silurian in age; but from comparison with similar groups farther north, Major Powell concludes it to be the base of the carboniferous.

The geological aspects of other portions are summed up in the Wheeler reports as follows: "Of the geology of the Mazatzal nothing is known. The Pinal Mr. Marvine crossed in 1871, and found to be constituted of granite, overlaid in part by sandstone and limestone, that are probably paleozoic, and in part by acidic lava. The Pinaleño includes three titled peaks: Saddle-back at the north, Mount Turnbull, and at the south, Mount Graham, the highest point of the region. At and in the vicinity of Saddle-back Peak, Lieutenant Emory (reconnaissance of 1846–47) noted the occurrence of granite, sandstone and limestone; and in the same vicinity carboniferous fossils were discovered by Lieutenant Whipple, (quoted by Mr. Marcou in his 'Geology of North America'). In the same neighborhood, and especially to the south-east, about the mouth of Aravaipa Cañon, the sedimentary beds are overlapped by great eruptions of trachyte. In the vicinity of Mount Turnbull, Dr. Loew noted granites and schists as predominant, but with some quartzite and limestone and lava. Mount Graham, from its north-east face, shows only gneissic rocks, and a syenite that, viewed in large masses, betrayed a trace of structure. The chief mass, and not improbably the whole of the mountain, is metamorphic. It is of imposing proportions, rising 6,000 feet from its eastern base (and nearly as much from its western), so abruptly that it is difficult of ascent. To the south-east the crust gradually descends, until in Railroad Pass it is buried by the valley detritus. The Chiricahui Mountains, beyond the pass, are inferior in magnitude to Mount Graham, and less simple in structure. From the peak Dos Cabezas to some distance beyond Camp Bowie they are constituted of syenite, schists, paleozoic strata and porphyry. The syenite is not uniform in kind, but a large portion is characterized by crystals of orthoclase, from one to two inches in length. The schists are thoroughly foliated, and in large part fall under the denomination of gneiss. In the vicinity of Dos Cabezas they contain magnetic iron ore, probably in quantity to give it economic value.

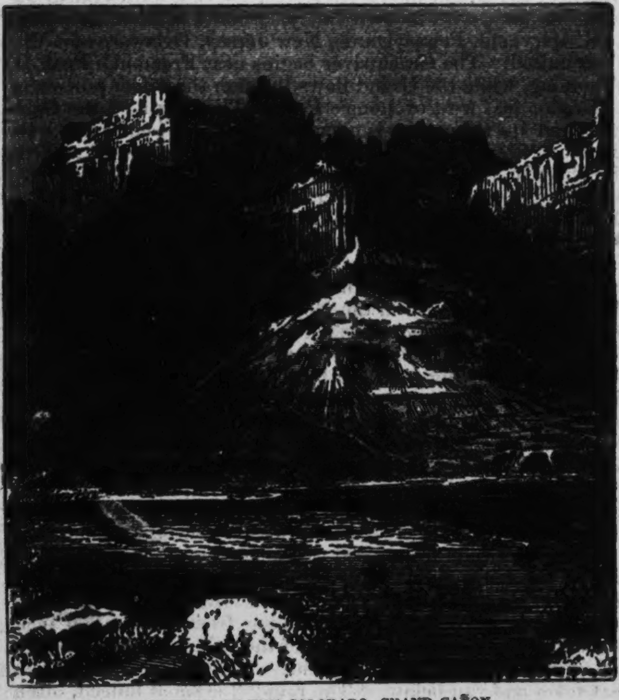
The work of scientific exploration and investigation is due almost wholly to the government expeditions, and the able gentlemen who have been and are still engaged in them. To the reports of Professor Marcou, who accompanied the expedition of Lieutenant Whipple in 1853–'54, and of Dr. Newberry, the geologist of Lieutenant Ives' expedition in 1858, is due the first knowledge of the plateaux and their geology. In the following year Dr. Newberry, with Captain Macomb, traversed the region east of the Upper Colorado as far north as the junction of the Green and Grand; and, since 1868, Major J. W. Powell has been engaged in the geological exploration of the Colorado and its western tributaries.

Of the north-eastern portion of the Plateau and its massive features Dr. Newberry gives this vivid picture: "Directly south the view was bounded by the high and distant mesas of the Navajo country, succeeded in the south-west by the still more lofty battlements of the great white mesa formerly seen by us from the Moqui villages, and described in my report to Lieutenant Ives. Of these high table-lands the outlines were not only distinctly visible, but grand and impressive at the distance of a hundred miles. Nearly west from us a great gap opened in the high table-lands which limit the view in that direction; that through which the San Juan flows to its junction with the Colorado. The features presented by this remarkable gate-way are among the most striking and impressive of any included in the scenery of the Colorado country. The distance between the mesa walls on the north and south is perhaps ten miles, and scattered over the interval are many castle-like buttes and slender towers, none of which can be less than 1,000 feet in height, their sides absolutely perpendicular and their forms wonderful imitations of the structures of human art. Illuminated by the setting sun, the outlines of these singular objects came out sharp and distinct, with such exact similitude of art and contrast with nature as usually displayed, that we could hardly resist the conviction that we beheld the walls and towers of some Cyclopean city, hitherto undiscovered in this far-off region. Within the great area inclosed by the grander features I have enumerated, the country is set with numberless buttes and isolated mesas, which give to the scene in a high degree the peculiar character I have so often referred to as exhibited by the eroded districts of the great central plateau. Here and there we caught glimpses of the vivid green of the wooded bottom-lands of the river, generally concealed by the intermediate and overhanging cliffs."

Elsewhere he describes a scene further to the west, which will bear reproduction: "The view swept westward over a wide extent of country, in its general aspects a plain, but everywhere deeply cut by a tangled maze of cañons, and thickly set with towers, castles and spires of most varied and striking forms; the most wonderful monuments of erosion which our eyes, already experienced in objects of this kind, had beheld. Near the mesa we were leaving, stand detached portions of it of every possible form, from broad, flat tables to slender cones crowned with pinnacles of the massive sandstone which forms the perpendicular faces of the walls of the Cañon Colorado. These castellated buttes are from 1,000 to 1,500 feet in height, and no language is adequate to convey a just idea of the strange and impressive scenery formed by their grand and varied outlines. Toward the west the view reached some thirty miles, there bounded by long lines and bold angles of mesa walls similar to those behind us, while in the intervening space the surface was diversified by columns, spires, castles and battlemented towers of colossal but often beautiful proportions, closely resembling elaborate structures of art, but in effect far surpassing the most imposing monuments of human skill. In the south-west was a long line of spires of white stone, standing on red bases, thousands in number, but so slender as to recall the most delicate carving in ivory or the fairy architecture of some Gothic cathedral; yet many, perhaps most, were over five hundred feet in height, and thickly set in a narrow belt or series, some miles in length."

This is a land of marvels. Between the Moqui villages and the lower portion of the Little Colorado lies the "Painted Desert," a "thing of beauty" but by no means "a joy forever." It would look much better from a railroad train than from a mule's back, extreme thirst not favoring æsthetics. It is the beauty of death, with a mimicry of life. Here are thousands of colossal columns, the remains of layers of earth of great thickness, carried away by slow denudations extending over many eras and leaving behind these land-marks of their former extent. The columns are streaked with bright red layers, the deep color being attributed to the oxydation of particles of feldspar in the granite from which the sedimentary rocks of which these columns are composed were obtained. From these red layers the desert derives its name. The Moqui Indians, however, have another name for it, based on another class of marvels reaching towards the shadowy realm. It has a combination of the "Fata Morgana" and the ordinary mirage of the African and Arabian deserts, superior to these latter in variety, distinctness and beauty, combining with them the "Fata Morgana" peculiar to some portions of the Mediterranean. On its air are depicted "palaces, hanging gardens, terraces, colonades, temples, fountains, lakes, fortifications with flags flying on their ramparts, inverted houses, towers, walled towns on conical hills with flags flying on their roofs, beautiful lawns and promenades, landscapes, spacious woods, groves, orchards, meadows with companies of men and women, and herds of cattle, deer and antelope, standing, walking, lying, etc., and all painted with such an admirable mixture of light and shade that it is impossible to form an adequate conception of the picture without seeing it." What wonder is it that this combination of Sahara and the Mediterranean should be termed by the Indians "Assama-unda," or the country of the departed spirit.

From a consideration of the great plateau, the student naturally and logically turns to the rivers of the territory and the wondrous cañons which form so amazing a feature. Foremost and unapproachable stands the Colorado river. It combines the waters of the Grand and Green rivers, and thus unites the draining of an area, with its own valley, larger than all of New England, Maryland, Pennsylvania, New Jersey, Delaware and Virginia united. The Green river begins near Fremont's Peak, in Wyoming, while the Grand flows through the upper portion of Colorado, just west of Long's Peak. The length of the Colorado and its tributaries is over 1200 miles, and embraces only three considerable streams after the junction is formed; one is the Rio San Juan, the northern fork of which rises in southwestern Colorado, and the southern fork in New Mexico. A third branch of this stream takes its rise in north-eastern Arizona, and is known as the Rio de Chesley. Another and more considerable tributary is the Colorado-Chiquito or Little Colorado, the northern fork of which rises in the Navajo forest, and the others to the south in the Mogollon mountains. From the point in the extreme northern portion of Arizona where the two Colorados unite, the great stream receives only two small streams, one flowing from southward, and the other—Bill Williams river—from the east, until it reaches the Rio Gila, near the thirty-second parallel, from whence about forty miles below it flows into the Gulf of California, the great inland sea that Cortez discovered. Nowhere on the continent, perhaps nowhere in the world, is there as remarkable a river formation. The upper part of the Colorado basin rises from 400 to 800 feet above sea level. It is set about with snow-clad mountains, varying in altitude from 8,000 to 14,000 feet. The lower portion of the basin is but a few hundred feet above the sea, but the river, here and there, runs by and forces its way through ranges of eruptive mountains, ranging from 200 to 600 feet. On the north side of this portion of the valley is a line of bold and vertical cliffs, often thousands of feet above the waters that foam and run below. The rain-fall is small indeed, often but three to six inches per annum, but the winter's snows are abundant, and when the summer comes they melt easily, and flowing down arroyo, gorge, cañon and chasm, they swell the Colorado as it rolls a red and turbid stream on its way to the Gulf of California. It is these rapid torrents whose abrasions have cut away the rocks for centuries, and formed the series of marvellous cañons whose great depths and wonderfully weird wonders of form and color have made the course of the Colorado so famous and sublimely picturesque. As the daring explorer, Major Powell, has expressed it: * "Every river entering these (the Colorado cañons) has cut another cañon; every lateral creek has cut another cañon; every brook runs in a cañon; every rill born of a shower, and born again of a shower, and living only in these showers, has cut for itself a cañon; so that the whole upper portion of the basin of the Colorado is traversed by a labyrinth of these deep gorges. About the



JUNCTION OF THE COLORADO, GRAND CAÑON.

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* Cañons of the Colorado, Scribner's Monthly, January, 1875.

basin are mountains; within the basin are cañon gorges; the stretches of land from cañon brink to cañon brink are of naked rock or drifting sands, with here and there lines of volcanic cones, and with black scoria and ashes scattered about."

Geologically considered, the cañons of the Colorado and of its tributaries, and the country which they intersect, are unsurpassed as a field for the study of river denudation. "Not merely do they exhibit the grandest and most impressive results, but they show the agent by which they have been wrought, still in vigorous activity; and the conditions that have guided denudation and determined the resultant forms, are there so little complicated that they may be differentiated and analyzed." The Grand Cañon is 400 miles long, and from 1,500 to 6,000 feet in depth. The river, for at least 600 miles, cuts its way through a series of vast cañons, and receives over 200 affluents, each forming a cañon of its own. It has a fall during the whole of its Arizona course of over 3,000 feet. It is claimed by geologists to have worn a channel of at 25,000 feet into the heart of the archæan and present mountain system. At the northern line of Arizona the river turns sharply to the south-west, and then to the west-north-west, striking the Nevada line, whence it flows for thirty-five miles to the north-west, forming the Territorial boundary line. At Fortification Rock it turns south, flowing thence in the same general direction to the California Gulf. Besides the Grand Cañon, in which culminates all the marvellous topography of this region, the Colorado forces its way above and below, forming the Kanab, Marble, Desolation, Black, Picacho, Limestone and other mighty cañons and gorges. Major Powell thus describes* the Grand Cañon at its culminating point:

"Stand on the south steps of the Treasury Building in Washington and look down Pennsylvania Avenue to the Capitol Park; measure the distance with your eye, and imagine cliffs extending to that altitude, and you will understand what I mean. Or, stand at Canal Street, in New York, and look up Broadway to Grace Church, and you have about the distance; stand at Lake Street Bridge, in Chicago, and look down to the Union Depot, and you have it again.

"A thousand feet of this is up through granite crags, then slopes and perpendicular cliffs rise one above the other to the summit. The gorge is black and narrow below, red and gray and flaring above, and crags and angular projections on walls which, cut in many places by side cañons, seem to be a vast wilderness of rocks. Down through these gloomy depths we glided, always listening—for the mad waters kept up their roar; always watching and peering ahead—for the narrow cañon was winding and the river was closed, so that we could see but a few hundred yards, and what might be below we knew not. We strained our ears for warning of the falls, and watched for rocks, or stopped now and then in the bay of a recess to admire the gigantic scenery; and ever as we went, there was some new pinnacle or tower, some crag or peak, some distant view of the upper plateau, some deep, narrow side cañon, or some strangely shaped rock. On we went, through this solemn, mysterious way. The river was very deep, the cañon very narrow and still obstructed, so there was no steady flow of the stream; but the waters wheeled and rolled and boiled, and we were scarcely able to determine where we could go with greatest safety."

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*Scribner's Monthly, 1876.

Of Marble Cañon, he writes:

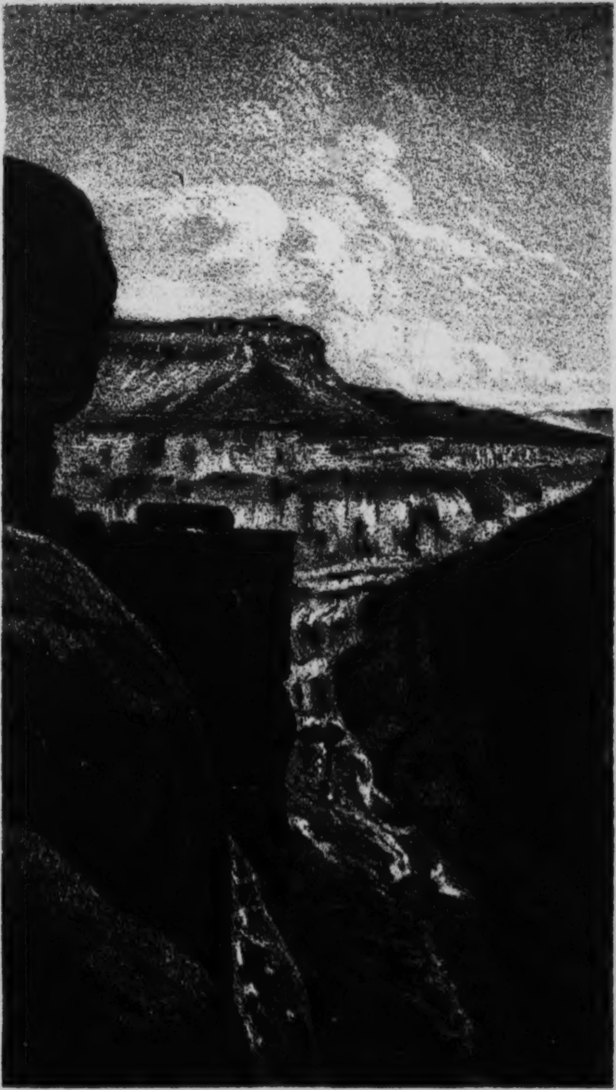
"The limestone of this cañon is often polished, and makes a beautiful marble. Sometimes the rocks are of many colors—white, gray, pink and purple, with saffron tints. * * * The walls of the cañon, 2,500 feet high, were of many beautiful colors, often polished below by the waves, or far up the sides where showers had washed the sands over the cliffs. At one place I had a walk for more than a mile on a marble pavement all polished and fretted with strange devices, and embossed in a thousand fantastic patterns. Through a cleft in the wall the sun shone on this pavement, which gleamed in iridescent beauty. Up into this cleft I found my way. It was very narrow, with a succession of pools standing at higher levels as I went back. The water in these pools was clear and cool, coming down from springs. Then I returned to the pavement, which was but a terrace or bench over which the river ran at its flood, but left bare at this time. Along the pavement in many places were basins of clear water, in strange contrast to the red mud of the river. At length I came to the end of this marble terrace, and jumped aboard the boat. Riding down a short distance, a beautiful view was presented. The river turned sharply to the east, and seemed inclosed by a wall set with a million beautiful gems. What could it mean?—every one wondered. On coming nearer, we found a fountain bursting from the rock high overhead, and the spray in the sunshine formed the gems which bedecked the walls. The rocks below the fountain were covered with mosses and ferns and many beautiful flowering plants."

The daring explorer has proved himself a prose-poet of no mean order, and nowhere does he revel in the very ecstacy of descriptive painting as when he depicts for us the marvellous scenery of this region. Here are some cabinet pictures that should be remembered:

"The plateau through which Gray Cañon is cut terminates abruptly on the south in a bold escarpment known as the Book Cliffs. The river below the cliffs runs, for a time, through a valley. Extensive sand plains reach back from the immediate river valley as far as we could see, on either side. These naked, drifting sands gleamed brilliantly in the midday sun of July. The heat reflected from the glaring surface produced a curious motion of the atmosphere; little currents were made, and the whole seemed shifting and unstable. One moment, as we looked out over the landscape, the atmosphere seemed to be trembling and moving about, giving the impression of an unstable land; plains, and hills and cliffs, and distant mountains seemed vaguely to be floating about in a trembling, wave-rocked sea, and patches of landscape would seem to float away and be lost, and then reappear. Just opposite our camp there were buttes, composed of rock, that were outliers of cliffs to the left. Below, they were composed of shales and marls of light blue and slate colors, and above the rocks were buff and gray and then red. The buttes are buttressed below where the azure rocks were seen, and terraced above through the buff and gray and red beds. A long line of cliffs, or rock escarpment, separates the table-lands through which Gray Cañon is cut, from the lower plain. The eye can trace these azure beds and cliffs on either side of the river in a long line extending across its course until they fade away in the perspective. These cliffs are many miles in length, and hundreds of feet in height, and all these buttes, great mountain masses of rock, seen through the shifting atmosphere, seem dancing and softly moving about." Again he writes: "The cañon walls are buttressed on a grand scale, and deep alcoves are excavated; rocky crags crown the cliffs, and the river rolls below. * * The sun shone in splendor on the vermillion walls, shaded into green and gray where the rocks were lichened over; the river filled the channel from wall to wall, and the cañon opened like a beautiful door-way to a region of glory. But at evening, when the sun was going down and the shadows were setting in the cañon, the vermillion gleams and roseate hues, blended with tints of green and gray, slowly changed to sombre brown above, and black shadows crept over them below; then it seemed the shadowy portal to a region of gloom." * * "Lying down, we looked up through the cañon and saw that only a little of the blue heaven appeared overhead—a crescent of blue sky with but two or three constellations peering down upon us. I did not sleep for some time, as the excitement of the day had not worn off. Soon I saw a bright star that appeared to rest on the very verge of the cliffs overhead on the east. Slowly it seemed to float from its resting-place on the rocks over the cañon. At first it appeared like a jewel set on the brink of the cliff, but as it moved out from the rock I almost wondered that it did not fall. In fact, it did seem to descend in a gentle curve, as though the bright sky, in which the stars were set, was spread across the cañon, resting on either wall, and swayed down by its own weight. The star appeared to be in the cañon, so high were the walls." * * The rocks below were red and brown set in deep shadows, but above they were buff and vermillion. The light above, made more brilliant by the bright-tinted rocks, and the shadows below, made more gloomy by the sombre hues of the brown walls, increased the apparent depth of the cañons, and it seemed a long way up to the world of sunshine and open sky, and a long way down to the cañon floor." Near Pipe Spring, there is a long line of cliffs, many hundred feet high, composed of orange and vermillion sandstones, named "Vermillion Cliffs." Powell describes them in these words: "The morning sun was shining in splendor on their painted faces. The salient angles were on fire, and the retreating angles were buried in shade. I gazed and gazed until my vision dreamed, and the cliffs appeared a long bank of purple clouds piled from the horizon high into the heavens."

The ascent of Mt. Turnbull is thus described: "Through crevices we worked, still toiling up, till at last we were on the mountain; a thousand acres of pine-lands spread out before us, gently rising to the other edge. There are two peaks on the mountain. We walked two miles to the foot of the one that seemed the highest, then made a long hard climb to its summit. And there, oh! what a view was before us. A vision of glory! Peaks of lava all around; below us, the vermillion cliffs to the north, with their splendor of colors; the Pine Valley Mountains to the north-west, clothed in mellow perspective haze; unnamed mountains to the south-west towering over cañons bottomless to my peering gaze: and away beyond, the San Francisco Mountains lifting their black heads into the heavens.". The temptation is very great to extract further from these charming papers on "the Cañons of the Colorado," but space forbids.

Turning from the picturesque to the utilitarian characteristics



LITH. BRITTON, REY & CO. S.F.

GRAND CAÑON OF THE COLORADO-MOUTH OF KANAB WASH, LOOKING EAST.

of this great stream, it will be found to present as marked an aspect. The area or basin drained by the river comprises approximately 241,965 square miles, or about 154,857,600 acres. Its elevation at Hanlon's Ferry, near Fort Yuma, is 120 feet; at the grand bend to the south, near head of Black Cañon, 900 feet; at the junction of the Green and Grand rivers, 3,860 feet, from whence the name Colorado begins. It is essentially a cañon river until it leaves the territory of the United States, when its character in this regard materially changes, and with it the peculiarities of erosion and alluvial depositions in vicinity of its shifting bed, while opportunities for diverting the same are more likely to be found. The climate along its banks varies partly with the elevation, but more largely with the amounts of rainfall, which, until reaching the Grand Cañon, may be said to vary from one-half to ten inches annually. In portions near the sources of Grand River, in the high, mountainous regions of Colorado, the rainfall increases somewhat in proportion to the altitude; and without any specific data on the subject it is safe to say that it reaches forty, if not a larger number of inches annually; but the areas showing the larger amounts of precipitation are comparatively small, and confined to the narrow valleys of the main stream and their side branches within the mountainous portions proper. No such amount of rainfall is known in any part of the Green River Basin, even at its source. Very little of this valley is available for agricultural purposes, and it would be difficult to improve large tracts of land along the main stream or any of its immediate tributaries. Within the second division, which extends from the Nevada and Utah line to the Gila and Salt rivers, there are strips of considerable size not desert, but diversified between mountain and desert, the northern portions of which, especially in the vicinity of the Salt and Gila rivers, are susceptible of cultivation, forming some of the finest grazing-fields in the world, with large patches of pine and other timber, and admitting of considerable settlement. Ridges traverse these portions, those running north and south being usually mineral-bearing that have been prospected, but can scarcely be said to have been worked for the precious minerals. The next division is that of the plateau and cañon region, the eastern limit running along the continental divide north as far as latitude 37 deg.; from that point to the mouth of the Green and Grand rivers; thence in a nearly due west line to the great mesa-wall, passing northward of the Lower Grand Cañon, with an arm of the great interior basin in the vicinity of latitude 38 deg. and longitude 113 deg., approximately.

The third portion is the province of the mountains, with their outlying foot-hills, being the basins, respectively, of the Green and Grand rivers, whose peculiarities have been noted by earlier explorers, and are now well known. The area of the first or semi-desert region approximates 72,889 square miles; the plateau province approximates 83,986 square miles; the mountain province 85,190 square miles. The majority of the land within the drainage of this river and its tributaries is still owned by the Government. The uses to which it may be applied must be confined largely to grazing and mining purposes, while some portions will admit of cultivation by irrigation process, in connection with the gradual development of the country, yet the husbanding of water becomes a matter of great import to all those who may at some future time occupy it. For a distance of 435 miles from the junction of the Green and Grand rivers it traverses territorial domain; and all that part of the Grand River still traversing public lands, as well as the basin of the Green River, is now owned by the Government, with few exceptions; the disposition of its waters is a subject over which the General Government should assume entire control, devising some wise and comprehensive plan of irrigation works. If the influences now dominating Congress do not consider these necessities, disaffection will increase, and the tendencies to disintegration, already seen in the far west, will become year by year more apparent.*

The navigable character of the Colorado is a matter of great importance. The distance from San Francisco to the head of the Gulf of California is 1,900 miles. The Southern Pacific Railroad Company now have control; the steamers employed being 400 tons each, and the barges they tow have a capacity of about 800 tons. The business is growing. The boats run from Yuma to Hardyville, making tolerably regular trips in connection with the railroad. From Yuma up the river to Hardyville and return takes from ten to twelve days, though a round trip has been made in five days, and at low water it has taken over two months. The river steamers have been as far up as Callville, which is 128 miles above Hardyville, or 641 miles above the mouth of the river. The low bottom lands of the river are very rich, yet at present almost in a state of nature, except where cultivated in a primitive manner by the Mojave, Yuma, Chemehuevis or Cocopah Indians, who raise good crops of wheat, corn, beans, pumpkins and melons. Not over two score of ranches are settled on the whole distance of over 600 miles, where in time there will be hundreds of large farms, and happy and prosperous homes. There are landings for freight at Hardyville, Camp Mojave, Aubrey, Colorado Reservation, Ehrenberg, Castle Dome and Yuma. The average current at ordinary low water is less than four miles per hour. Against such a current a stern-wheel steamer towing a loaded barge will not make more than fifty miles per day, going up stream and running only in the daylight, which will usually be a necessity. Coming down stream the progress will be more rapid. Constant navigation and improvement works will lessen the difficulties that now impede navigation. Above Fort Mojave there are no sand-bars and the current is defined. It is not as difficult as the Upper Missouri and Yellowstone rivers. The editor of the *Yuma Sentinel* thus describes, in a recent issue, the river below Yuma:

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* Wheeler's Report.

"The mouth of the Colorado River is fast becoming an unknown country, since the steamboats have stopped running below Yuma. But for its belonging to Mexico, whose government affords no security to life, no encouragement to industry and no protection to property, that country would have long ago been filled up with settlers. The valley is wide, and composed entirely of rich alluvial soil. The climate is superb; the heat of summer is tempered by breezes from the gulf; the dry winds of the desert, lying on both sides of the valley, dissipate and oxydize all miasma arising from decay of the rank vegetation. A large part of it is subject to overflow. Extreme tides rise to a height of thirty-five feet; the fresh water of the Colorado is backed up and floods the country for miles. For rice culture no better land can be found. Hemp grows wild in enormous fields subject to occasional overflow. On the higher and drier parts of the valley grow cotton, sugar-cane and tropical fruits, as well as cereals. For the sportsman this country is a paradise. The lagoons formed by the flooding water are filled with fowl. Fish abound in endless variety, from the delicious mullet to the monster jew-fish; hook, net and harpoon can here find unceasing employment. Immense beds supply excellent clams. At the lower part fresh water is comparatively scarce, though the Indians find it readily by digging out seepages along the bank of the sloughs. Hot and mineral springs are found quite near the coast. A feature of the Colorado, near its mouth, is the "bore." This name is given to a high wave, which daily comes rushing in like a wall of water. It is an effect of the tides, and has its parallel in few other rivers of the world. To small boats, or even to steamboats, it brings peril, unless they be skillfully handled. Green turtle abound in the gulf, and occasionally some of these immense chelonians are captured near the mouth of the river. From its isolation this valley has many plants and forms of life peculiar to itself. But just now that book is sealed."

The agricultural character of the valley is treated of in another chapter. Among the interesting discussions connected with the present and future development of Western Arizona is that of the diversion of the Colorado so as to reform an interior sea or lake of the Colorado desert, which is the dry bed of some ancient sea. In Wheeler's last annual report the subject is considered at length, and decided upon adversely. Summarizing the report, the following point appears: The river from the mouth of the Grand Cañon down to Chemehuevis Valley, just below the Needles, may be said to flow through a cañon which occasionally widens into a narrow valley. The ranges between which the river flows are nearly 4,000 feet high at the great bend, the divide on the west side, opposite Cottonwood Island, being 3,900 feet, and that on the east side, at Union Pass, 3,800 feet; while the summit of the Sacramento Valley, near Chloride, is about 4,100 feet above sea-level. Coming southward the river ranges become sensibly lower. Thus the highest altitude of the trail over the Monument Range is 2,300 feet, and the summit of the river range on the west side, opposite Ehrenberg, is but 934 feet. Beyond the river ranges are higher ones, however, which must be cut to accomplish any diversion, which it is evident cannot be accomplished between the mouth of the Grand Cañon and the head of the lower valley. In this valley there is a large area which could be made productive if irrigation were practicable. An effort in that direction has been made at the Indian reservation at old Camp Colorado, on the east bank of the river, above La Paz. Here an irrigating canal, several miles long, has been tried. The soil was so porous and unstable that the banks were constantly undermined, causing them to cave in and fill the canal. After repeated trials the projector had concluded to flume the entire canal, which can only be done at great cost where lumber is scarce and prices high. Even if irrigation were practicable, it would be necessary to build levees to prevent the river from overflowing the bottom-lands and destroying the irrigating canals and ditches.

The Great Colorado Valley is terminated at the south by the Chocolate Range, through which the river passes, and emerges from the Purple Hill Pass into the wide valley which extends to its mouth. Below the Purple Hills there are no formidable mountain ranges on the west side of the river, except a short detached range, called the Cargo Muchacho and Pilot Knob. The divide between these mountains is about 278 feet, while the altitude of the water surface at Fort Yuma is 120 feet. A canal through this opening would therefore require a cutting of nearly 160 feet, and besides would have to cut through the sand ridge, west of Pilot Knob, in order to gain lower ground more rapidly than by keeping to the north of the sand-hills. Even in this case the length of the canal, from Fort Yuma to the point where the surface of the ground is of the same altitude as the water-surface at the latter place, would be at least thirty miles long. These conclusions are arrived at from data obtained from the Texas Pacific Railroad surveys, and also by levels run by my party from Hanlon's Ferry over the divide north of Pilot Knob. In order that the canal should be entirely within the California boundary, it must cross the divide to the north of Pilot Knob. This, as has already been shown, would necessitate a long, deep cutting, partly through rock, and a passage through the sand ridge. This passage could only be effected by means of a flume or tunnel, to protect it from filling up with sand. A canal from some point below the boundary would be more practicable and less expensive in construction and maintenance. Surveys show that there is a steady descent, with but few breaks, from the altitude of 137.89 feet at Fort Yuma to 38.8 feet below the sea-level at a point 6½ miles west of Indian Wells. From this point the rise is rapid and constant up to the mountains which border the desert on the west.

Leaving the Colorado itself, its affluents in Arizona must next attract attention. The Little Colorado, or Colorado-Chiquito, is characterized by a cañon system not unlike the larger river, except that it is not so extensive in area or massive in detail. Still its features are imposing enough to gratify the most adventurous of explorers. The wide cañons of the Colorado-Chiquito, which make their appearance not far above its confluence with the great Colorado, are from 1,000 to 2,500 feet in depth, but do not run back more than four miles; and on arriving within a distance of six miles of the confluence, the land is quite level, grassy and full of game. The height above the inaccessible rivers is 2,500 to 3,000 feet. There is a sandy beach at the confluence, which renders it practicable to follow up the Little Colorado above its mouth seventeen miles, where an Indian trail on the north side makes the plateau accessible; the cañon, however, continues thirteen miles further up the stream. This cañon is 2,000 to 3,000 feet deep, but has no falls. There are others in the river's course, which, however, also open into pleasant valleys. Quite a number of Mormon families are now settled therein. The region about the headwaters of this stream is characterized by its presenting an impingement of the park system, and affording a series of lovely landscapes, to which ere long the attention of tourists will be favorably directed.

The valley of the Gila forms the most noticeable feature of Arizona topography, next to the Colorado Valley itself. It flows from its confluence above Yuma, eastward for about 280 miles, where it parts into the San Pédro, running directly south of the Gila itself—or, as it has been termed, the San Domingo and the Arivaipa. The entire course of the Gila, which rises in New Mexico, is about 500 miles. From the point at which the San Pédro diverges, the Gila flows westward through a valley ranging from two to ten miles wide. It can all be brought under cultivation, and by irrigation be made to bear luxuriant crops. East of that point it runs through occasional small valleys, and forces its way through the Mogollon Mountains. In his "Marvellous Country," Mr. Cozzens describes a portion of the Gila Cañon:

"We commence to descend the banks of a deep ravine, our mules carefully picking their way along the path, constantly impeded by huge boulders of granite, blocks of sandstone, fissures and chasms worn into the earth by floods ages ago. Around you are to be seen mountain peaks, ranges, mesas, pinnacles and crags, bald and gray. * * We suddenly find ourselves upon the edge of a cañon two thousand feet deep. * * The walls are perpendicular and of a blood-red color. No vegetation is anywhere to be seen; nothing but the stones around us and the grayish-white alkali on the surface of the plain on which we stand, with its surroundings of crag, pinnacles, towers and mesas of rock rising far above us, until the summits pierce the clouds on the one side, and this black, yawning abyss before us."

One of the little, park-like valleys with which Eastern Arizona abounds, is thus described in connection with the foregoing:

"A beautiful valley, carpeted with a rich greensward, extending fully three miles in length and nearly if not quite a mile in width, through which a stream with water clear as crystal meandered over its bed of pebbles; its banks skirted with a kind of small willow, whose foliage of yellowish-green contrasted strangely with the darker shade of the grass, and all surrounded by a range of bluffs fully a hundred feet high, worn into representations of castellated forts, with bastions, scarps, lunettes, gorges and curtains, till one could almost fancy the whole encompassed by an impregnable fortress."

There is one topographical feature of the Gila Valley which must command even more attention in the future than it has in the past. Reference is had to the fact that in a mountain region north and south of nearly 2,000 miles extent, it presents the only comparatively open roadway between the Mississippi Basin and the Pacific Ocean. The future effect of this important fact, commercially and politically, is hardly to be over-rated. By the valley of the Santa Cruz, Mexico will be knit to us, and the entire southern section of the Union will be connected through this roadway with the growing Pacific Coast. As a matter of political unification, the importance of this topographical fact cannot be readily over-rated. It must be regarded by every believer in the territorial and commercial integrity of continental union, as one of those mighty facts in the physical geography of North America which tend to point to the continent as the home, now and hereafter, of only one people, speaking a common tongue and recognizing only one flag and one government.

CHAPTER IV.

THE TERRITORY'S MINERAL RESOURCES.

SKETCH OF THE SILVER BELT. FROM CERBAT MOUNTAIN TO THE PATAGONIA. CHARACTERISTICS OF THE ORES AND LODES. LEAD AND COPPER. A VARIETY OF MINERALS. THE COAL FIELDS. YAVAPAI AND PIMA. A COPPER BELT. RICH PLACERS. FISSURE VEINS. A MINERALOGICAL TABLE. THE PRODUCT OF ARIZONA. PROF. RAYMOND AND MR. VALENTINE. ADVANTAGES FOR CAPITAL AND COINAGE.

A recognized authority and metallurgist, Henry Howe, says: "Silver mining in Arizona possesses some great natural advantages over such mining in central Mexico. * * Its distinguishing feature is in the superior richness of the ores, and in their geological position. * * Rich lodes cross each other at the surface. This confirms the theory of Humboldt in respect to the deposits of silver in northern Mexico, viz: that the proportion of silver in the ore would be found to increase as you advance toward the north. This is accounted for geologically by the *dip* of the veins, the rich portion of which, being near the surface at the north, recedes from it as the lodes tend southward, until in New Mexico it is often found only at a depth of more than a thousand feet from the surface. What I have seen of ores extracted from them almost induces one to adopt the theory that the proportion of silver contained in the ores increases as you advance toward the north; a theory which is very generally believed at present in Mexico, and which is certainly confirmed by the superiority of all the northern ores to those of the richest districts in the south.

"The idea probably originated in the discovery of the famous Bolas de la Plata (balls of silver) of Arizona, in the beginning of the last century, which was and probably still is believed in Europe to be one of those fables with which mining countries always abound. But the attention of the present Government of Mexico having been drawn to the subject, a search was made in the vice-regal archives by order of the President, for the correspondence which was known to have taken place respecting it in the year 1736.

"This correspondence I have seen, and I have in my possession a certified copy of a decree of Philip the Fifth, dated Aranguez, 28th May, 1741, the object of which was to terminate a prosecution instituted by the Royal Fiscal against the discoverers of Arizona, for having defrauded the treasury of the duties payable upon the masses of pure silver found there.

"The decree states the weight of the balls, sheets, and other pieces of silver discovered, (*bolas, planchas, y otras piesas de plata*) to have amounted to 156 arrobas in all (4,033 lbs.); and mentions particularly one mass of pure silver which weighed 108 arrobas (2,700 lbs.); and another of eleven arrobas, upon which duties had been actually paid by a Don Domingo Asinendi, and which, as a great natural curiosity, (*como cosa especial*) the King states ought to have been sent to Madrid."

"The decree," continues Mr. Howe, "ended by making the district royal property, and directing the mines therein to be worked on royal account—a step which had, naturally, the effect of destroying all private enterprise."

H. G. Ward, author of a valuable work on Mexico, published in 1827, and at the time British Chargé d'Affaires in that country, gives a great deal of most valuable information as to the mineral wealth of the northern Mexican States. He says, in Vol. II, page 129, that "they all possess, in a greater or less degree, the same advantages; *richness of ores, and veins productive almost at the surface;* that few have been worked to any extent; and consequently that the risk of making the necessary experiments there is trifling." In the northern belt referred to, Arizona and New Mexico were embraced. This is proved by the following reference to an enterprise which he mentions: "They have taken up contracts for the mines of Arizpe, (about 30 deg. north latitude) in a situation possessing great local advantages—a fertile country, the vicinity of two large rivers," (evidently the Colorado and Gila) "and a communication by water with the Pacific. The mines themselves were formerly celebrated for their richness."

Judge Wilson, in his valuable work on Mexico, published in 1855–6, gives full accounts of the resources of Sonora, and makes several references to known portions of Arizona. He alludes also to the *Bolas de la Plata*, and speaks of the abundance of the placers which explorers "have not washed for want of water in some places, and from the difficulty that exists in others in order to work them, such as those of Arizuma and La Papagueria." Again, he wrote: "In the part of Muchachos situated in the Sierra Madré, between Tucson and Tubac, and in Mogollon, a place situated in the mountains of Apachuria; in those of Papagueria, and near the Colorado, are found great masses of virgin iron, and abundant veins of the same metal. Cinnabar was discovered in 1802, in the hill of Santa Teresa, situated in the *mineral* of Rio Chico, and in the hills which are at the mouth of the Colorado it has been found in the past age. Copper is also found in * * Sierra de la Papagueria, and particularly in Couanea, from which have been extracted great quantities of this metal, with a great ley of gold. Metals of lead (*metales plomosos*) abound in Aqua Caliente, Alamo-Muerto, La Papagueria, * * ."

The well known colonial policy of the Spanish Government, instanced in the action on the *Bolas de la Plata* specified, rendered it impossible to develop among the people of Mexico the energy or increase of population requisite to repress the Apaches; in consequence of which mining enterprises, otherwise undoubtedly profitable, had to be abandoned. Even after Mexican independence had been acknowledged, the results of previous misgovernment could not be obviated. The Spanish power was only too aggressive, but its energy was spasmodically and not systematically enterprising. With every disposition to wrong and irritate the Apaches, they had not the capacity to subdue them; and both the disposition aud incapacity continued under the Mexican authorities—the consequences of which, as to Indian matters, were left to the Americans to overcome, in which their success has been so recent as to have only given time to plant the germs of industrial enterprise, either in mining or agriculture.

The great silver belt of Arizona, so far as yet developed, commences about forty miles south of the bend of the Colorado, in the north-eastern part of the Territory, and extends in a line varying in width from forty to eighty miles south-easterly to the Gila river, and thence southerly to the Mexican line in the south-eastern portion of the Territory. There is, however, a break in this line of about seventy miles to the northward of Tucson, to offset which, scattered mines and dry placers are found in the western portion of Pima county, the mineral resources of which portion have been but little explored; to the extreme south-eastern portion of the Territory, adjacent to the Chiricahui and Dragoon Mountains, the same remark is applicable.

The copper region is scattered, the principal seat of this industry being at Clifton, in the extreme south-eastern part of Yavapai county, where the amount of rich copper ore is enormous, and less than 100 miles north-east from the recently discovered coal field of Arivaipa Cañon. Copper, combined with gold and silver in ores very rich in the latter, abounds in the Globe Mining District between the Apache and Pinal Mountains, and between the Gila and Salt rivers. It is also mined on the 113th parallel, near the junction of Maricopa, Pima and Yuma counties, at the old Ajo mine, and to a small extent in various portions of Yuma county. It is worked largely and profitably at the Planet mine, near Bill Williams river, within a few miles of the Colorado; and it is not unknown in some of the Cerbat part of Mojave county.

Lead is found in the ores of the Globe District, Pinal county, but unfortunately insufficient for the smelting processes necessary to extract the precious metals in a large proportion of the ores in that district; but it is profitably obtained at the Pima and San Xavier mines south of Tucson; and there are indications of extensive deposits on the western slopes of the Santa Rita Mountains. In fact, the whole Santa Cruz region has more or less argentiferous galena. But the principal galena field of Arizona is in Yuma county, from which it is largely exported; its ores there also contain gold and silver. With the completion of the railroad, the lead of Yuma and copper ores of the Globe District will be so brought together as largely to increase the value of both.

Of other metals, magnetic iron ore is found in the schists of the Chiricahui Mountains, near Camp Bowie, in sufficient quantities to give it some prospective value for local purposes. Iron in carbonates and oxyds is also abundant in various portions of the Territory; but industrial and manufacturing conditions are not yet such as to render it of special value. Platinum is found in the Black Cañon of the Colorado and on the Agua Fria. There are traces of tin in various localities, and of nickel in one place. Large beds of gypsum are reported on the San Pedro. Cinnabar has been found near Ehrenberg, on the Mojave and Prescott road, and at other points in the vicinity of Prescott; but has not yet been mined in paying quantities, so far as known. Large salt deposits have been seen between the Dos Cabezas and Dragoon Mountains. The waters of the Salinas or Salt river have a brackish taste—hence its name. This is believed to come from the deposits or beds of rock salt in the cañon through which the stream finds its way. Salt is also found in small quantities near Sunset Crossing, on the Colorado-Chiquito; and there are said to be mountains a few miles east of the Colorado near Callville containing extensive deposits of pure, transparent, beautifully crystallized salt, unexcelled either for table or other use. Passing from one extreme of necessity to another of luxury, blood-red garnets have been found in the Nacimiento desert, near Fort Defiance, scattered over loose sand, their surfaces indicating transportation, probably from fifty miles to the northward, where they are found in syenite. And although a diamond swindle was based upon these facts, it is none the less true that garnets have been found not only near the eastern border of Arizona, but at its western border on the same parallel (36 deg.) on both sides of the Colorado river. When, to all these requirements of necessity and luxury we add that fact which probably made Great Britain the manufacturing centre of the world, nothing more than its agricultural facilities are requisite to make Arizona, when its resources are developed, the richest and most productive State in the Union. But its recent coal discoveries, filling up and cementing as they do its other vast resources of natural wealth, will be considered in detail after some further outlines as to the extent and abundance of its metals.

Commencing at the north-eastern extremity of the silver and gold belt, we find the mines of the Cerbat not equal to those of some districts in the breadth of their veins, nor to others in the richness of their ores. Some ores are free milling, and others require smelting or roasting. With two or three feet veins, ranging in yield from $100 to $500 per ton, in a country abounding in the main accessories to successful mining, plenty of wood and water, and at an elevation which ensures a bracing, healthy climate, free in general from exhausting heat and only cold enough to give a zest to existence, the mines of the Cerbat range ensure a rapid growth not only of facilities for mining itself, but of the means for realizing the comforts of every-day life, and consequent facilities for social and domestic relations, which are too commonly wanting in most mining regions. And notwithstanding the chronic outrages in the way of deficient mail service to which the people of Mojave county have for years been subjected, there is probably no part of Arizona where prospects are brighter for a permanent growth founded upon industry, intelligence and a combination of natural resources. These mines, principally lying between the summits of the Cerbat and Blue Ridge mountains, have crept eastward over those of the former into the Hualapais valley, and thence still eastward over the next (Peacock) range, to the rich Hackberry mine, about thirty miles west of Mineral Park. A singular feature of Mineral Park is its bitter springs, which contain sulphides of calcium and magnesium, with traces of manganese and iron; the latter ingredients coating the rocks over which they pass with a black film of oxyd of iron and manganese, as is extensively the case with the rocks of the Mojave desert, in the adjacent portion of California, thus adding to the desolation of that singular region. Similar phenomena from this cause have been observed in the Libyan desert, and on the Congo and Orinoco rivers, which with other circumstances as to climate, etc., indicate that the Pacific slope is a microcosm of the world, where Italy, Egypt, Arabia, Timbuctoo, Kamschatka, Brazil and the "gem of the sea" can all be found within a week's travel of each other; more especially when the "missing links" of railroad are completed.

Returning to Mojave county, moving southward to what is now one of the great lodes of the mineral world, containing those original mines with a numerous progeny on the same lode less distinguished, it is found that the capacity of the McCracken mine (or mines, as there are two of them) to produce seems only limited by the number of men employed and the milling capabilities therewith connected, which, as soon as the new twenty-stamp mill at New Virginia on the Big Sandy is completed, probably before this book goes to press, will not be less than $75,000 to $100,000 a month. Its ores are richer than those of the Comstock, that nets $4,000,000 to $6,000,000 profit per annum; but the McCracken is less remarkable for the richness of its ores than for the enormous breadth and extent of the ore body. It is known to reach forty-five feet; the poorest of its ores run about $55, which is $10 more than the Comstock. The "Signal" mine, immediately adjacent, is estimated to produce at present about the same as the McCracken, its capacity being limited only by the same causes. It now produces sixty tons of ore daily, which can easily be raised to 100 tons. Thus these three mines (the McCracken being two) will alone within one year produce nearly as much as all Arizona has hitherto been credited with at the highest estimate. The aggregate product of the mines in Mojave county is reasonably estimated at $200,000 per month for some time past, with a definite prospect of $300,000 to start with on the new year. And only just across the Bill Williams river, in Yuma county, within ten or twelve miles of the McCracken, are the Planet Copper mines, concerning the product of which no data are accessible. The country in the vicinity of the McCracken is unimaginably desolate, and in all other respects destitute. But for the mine it must ever have remained an irreclaimable desert.

About this place there was a "missing link" between the Mojave and western Yavapai mining country, supplied in part by recent discoveries on Santa Maria creek, a tributary of Bill Williams river, heading in the Sierra Prieta range to the west of Prescott; around which range, and smaller ones, cluster mines almost numbered by the ten thousand, chief among them being the "Peck." This mine was discovered in 1865, but its development has been rather recent. The company expended over $200,000, mostly in prospecting their mine, the richness of which appears to increase with the depth; so that they now at 312 feet have a large body of ore paying $10,000 to the ton, and some as high as $17,600. In October last they had $300,000 worth of ore on the dump, and $634,500 in sight; but until recently had to carry their ore on mule back some fifteen miles or more to the mill. They now have a new ten-stamp mill on the ground, where the young town of Alexandra has sprung up, which mill cost about $75,000. The gross product of the mine has been $50,000 per month, with definite prospect of increase. The flow of water from the mine at a level of sixty feet above the mill is 18,000 gallons per day, forming a valuable water-power, etc., when conveyed to the mill. The mine is of extraordinary interest, not only from the richness but the curious character of its ores. The vein is a true fissure, very wide, partaking mostly of talcose matter, stained with ferric oxyds, carbonates and chlorides of lead and copper, richly impregnated with chloride and horn silver, presenting a great variety of tints and forms, deeply interesting and puzzling to miners and others.

Omitting any further details as to the mines of western Yavapai, it may be well to notice that this mining region is extending eastward near the Maricopa line on both sides of it, commencing with Cave creek, a tributary of the Agua Fria; next to which come the new mines on the Verde river, then the new discoveries on the Mazatzal range; and lastly, the rich mines in the Tonto basin, which are not far north of the immensely valuable mines in the region of the Apache, Pinal and Superstition Mountain ranges and their intervening, elevated, well-watered, fertile and healthy valleys. Chief among these mines loom up as giants the Stonewall Jackson and the Silver King mines; one piece from the former, found in October last, weighed 559 lbs., and contained 80 per cent. of silver; and a lot of ten tons of selected ore from that mine gave 60 per cent. to 70 per cent. of silver. Its vein is very narrow, but never broken. One man took out of the "Democrat," near by, 1900 ounces in two days. At the Sherman, five miles distant, a half silver nugget weighing 450 lbs. was obtained. Messrs. Morris and Styles, in the Globe District, took out $10,000 worth of ore from a shaft less than forty feet in depth. Flat ledges in the Richmond basin, Globe District, gave $5,000 to $15,000 per ton; even the loamy matter on the top, three to ten feet in depth, gives $100 to $300 per ton. The Silver King, Pioneer District, first-class ore assays $8,000 to $20,000; second class, $1,000 to $7,000. The ore is white quartz of fine texture, studded with particles of silver connected by threads of native metal. Ore from the Silver Belle mine, in the same district, assays from $300 to $3,000 per ton, and is all free milling. The Guajanato mine, in the same vicinity, has a vein four feet in width that assays up to $10,000, from which twenty tons were secured, averaging, as estimated, $2,000 per ton. Ores from inferior mines in the district assay from $100 to $500; and in the Randolph or Pine Grove District, from $100 to $2,000 per ton. Such a mine as the Comstock, if discovered in this vicinity, would, notwithstanding its extent, scarcely be looked at, in comparison with scores of mines that would far better repay the labor and capital invested. In the Globe District many of the ledges lie in limestone, and all of them run with the formation and not against it. The silver ores are mostly combined with sulphur. Rich specimens of chloride, bromide and iodide of silver are found at the surface, but gradually this character of ore disappears, and antimonial sulphurets are found instead, proving the ores to be very rebellious. In nearly all the veins more or less copper has been found; and so far the presence of copper has been an infallible indication of silver. The general country rock is dioretic slate and hornblende over a stratum of gneiss. In this district a man is said to have bought a hole fifty-seven feet deep for $120,000, and got his money back in sixty days. Much of the bullion produced goes to Silver City and Mesilla, to pay for goods, for which bullion New Mexico thus gets the credit which rightfully belongs to Arizona, though not supplying either the ore or the capital. Improved means of communication will obviate this injustice.

Here there is, for the present, a gap of about a hundred miles between the mining districts of Pinal and those of Pima, in the vicinity of Tucson and southward to the Mexican line. This is the country of old—yes, very old—mines, running back to pre-historic days, and now from time to time being rediscovered. Among these is one located about ninety miles southeast of Tucson, on the Mexican line in the Huachuca mountains.

The modern locators recently entered the shaft and came upon a remarkable cave, of which the Indians had preserved the tradition. They found a large cavern 500 feet long and forty wide. In the center was a small lake of clear water. At the end deep water appeared, and lighted candles set afloat on a board showed that the cavern narrowed to a crevice in the mountains, through which the water disappeared. Some of the mines on the southern slope of the Santa Ritas were worked centuries ago by the Jesuits, and again from 1856 to 1861, when given up, after several of the leading men had been killed by the Apaches; they slumbered until 1875, when resurrected by Colonel W. G. Boyle, a mining engineer and expert of large experience, and have now reached a point at which success is certain. The value of the ores of the Aztec District, on the Santa Ritas, has been tested by quite a number of distinguished scientific and practical engineers, geologists and miners. Ores from croppings range from $20 to $343, and from the shafts $56 to many thousands of dollars. J. Ross Browne, in a report dated May 1st, 1871, based on personal inspection of the district, makes an instructive comparison between the Comstock lode, on its actual results, and the equally certain results that would follow the same amount of labor (4,000 men) on the Santa Ritas, viz:

330,000 tons of Comstock ore, at $45 per ton	$14,850,000
Cost of reduction, at $30 per ton	9,900,000
Net yield, $15 per ton	$4,950,000
165,000 tons Santa Rita ore, at $100 per ton	$16,500,000
Cost of labor and treatment, at $7.50 per ton	1,236,500
Net yield, $22 per ton	$15,263,500

The difference in cost of reduction is accounted for by reason of the great facility in the Santa Rita region for obtaining wood, forage, timber and water. This cost, so far as the price of labor affects it, is much less in Nevada than it was; but the expenses must still greatly exceed the same expenses in the vicinity of a rich farming country, well watered and well timbered. Moreover, the average yield of ore on the Santa Ritas might safely be estimated at $150 per ton. In the Salero and other old mines, Mexican traditions put the yield at $340 to $680. These remarks on the Santa Rita mines are largely applicable to the other mines and districts lying between Tucson and the Mexican line, and within fifty miles each way of the 111th parallel of longitude.

Probably the most remarkable placer mines in the world are those of Richmond Basin, in the Globe District; the three to ten feet of mud on the top of the rock, constituting, with the loose ore on the bed-rock, the placer portion of the mines. Placers are also rich and extensive on the Santa Rita mountains. They were formerly profitable on the Hassayampa, Lynx, Turkey and other creeks in the vicinity of Prescott, and probably are even now richer than the forks of the American river in California, where thousands of persons still manage to support themselves; but are considered of no account in Arizona. Over large areas in the western part of Pima county dry placers are still occasionally worked by Indians and Mexicans to a small extent, and the richness of the river bed near Gila City has at last secured the attention of capitalists, who are now making arrangements to uncover it. In the same vicinity placer mining has long been more or less profitable to individual effort. Near Ehrenberg old placer ground has been re-occupied and a larger area discovered. These are but a few of the more prominent placer regions of the Territory, soon if not now to be available to poor men as well as rich, if Arizona so far profits by the past experience of California as not to permit its riches to be carried off by aliens. In regard to the principal copper deposits and indications, Professor Raymond, in his United States Report for 1875, gives a valuable letter from Mr. A. Harnickell, a large dealer in copper, from which the following extracts are made:

"The mountains in which the veins and deposits of copper occur lie north of the Gila river, and between its tributary streams, the Rio Francisco, Prieto, and Bonito, in Arizona, extending to near Silver City, in New Mexico; and although at a considerable altitude, they are easily accessible, well watered, timbered, and even fertile. The copper ores, at any depth thus far reached by the miner, are all of the rich decomposed varieties. The nature of the copper ore in the veins appears the same on top of the mountain as in the gorge 1,000 feet below; the same a few feet below the outcrop as at the bottom of a shaft; richer by far, and in greater volume, than in the famous mine of Urmeneta in Chili. Solid masses of red oxyd, copper glance, and true carbonate are the regular ores of the veins, as distinctly separate from the varied gangue-rocks of clay, limestone, etc., as the most economical miner could wish, and lavished upon the mountains in truly gigantic proportions. Yellow pyrites are not found as yet, but in several places so much oxydized iron occurs with the glance as to indicate there a trans-

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formation from pyritous minerals. The average yield of the ore dressed by hand is thirty-five, fifty and seventy per cent. of copper; while, unlike sulphuret ores, these oxydized ores can be smelted almost as readily and cheaply as the concentrated native copper-mineral of Lake Superior, which, in fact, does not average much higher in percentage of copper.

"It is obvious that this great wealth of copper, the richest formation thus far discovered on this continent, must attract attention. But owing to the distance from railroads, and the greater difficulty than with precious metals of marketing the products, no great influx of mining adventurers has taken place; but better than this, commercial enterprise has taken hold of some of the mining claims, working them with capital, skilled labor, and good management.

"The great mines, however, are over the border in Arizona, within the net of the Gila streams, south of the Sierra Blanca and east of the Cordilleras de Gila, being situate, politically, in the White Mountain Indian reservation. Croppings and deposits of carbonate in various places and directions invite and amply merit thorough geological prospecting. Thus far, however, only the oro-hydrography of the region has been ascertained and reduced to accurate maps for the use of the Government, and not yet published. This labor, as well as many other difficult tasks, was performed by that splendid corps of explorers, Lieutenant Wheeler's expedition. Two mines, or veins, have been sufficiently prospected and explored; and these alone demonstrate that we have here the wealth of the Chilian mines concentrated in a few miles.

"The Longfellow mine, situate some ten miles west of the post-office town of Clifton, is a curiosity in its way, and unlike anything thus far found in copper formations. The length of cropping stripped thus far, simply because it is all that appears on the surface, and satisfied all curiosity, is only 250 feet. The length of copper-bearing outcrops, in extension of this, however, is admitted to show thousands of feet, giving the idea of a great vein having given rise to them. The ore cropped out along the slope of a mountain and followed the turn of the mountain. The miners have labored hard to find the direction of their vein proper, if it be a vein, but without success. Wherever they sunk or tunneled on the slope of the hill, sixty, eighty, one hundred feet and more, below the outcrop, and without any dead work, they broke out ore; penetrating seventy feet into the mountain, at a short distance below the outcrop, nothing but ore was found, and the place has thus necessarily been turned into an open quarry, and engineering operations adjourned to ten years hence. The thing resembles a large iron-ore bank, and indeed iron and clay occur with the copper-ore. Some seventy-five tons of it, undressed, were shipped to Baltimore, and yielded thirty-five per cent. of copper. Since then, most of the ore with gangue is thrown aside, and only the copper-glance and red oxyd transported to the smelting-works at Clifton, where the Mexican blast-furnaces are first used—worked by hand-bellows—have given way to reverberating furnaces run by Welsh smelters from Baltimore, who have built a stack 120 feet high and make their own brick. A good water-power, furnished by the Rio Francisco, drives, crushes, etc., and may finally be used for pressure-blast engines should half-high furnaces be erected for quick work. Wood being plenty, of great pyrometric value, (mesquit) and only a limited business contemplated at present, the reverberatory furnaces are now most convenient. The stock of ore in dumps ready for smelting, or in course of transportation by huge wagons from the mine to Clifton, is 1,600 tons, which, it is calculated, will produce 1,500,000 pounds of pig-copper. The mining, or rather quarrying, goes so much ahead of the capacity of smelting and transportation that a pause had to be made, and now it is likely that the miners will have a mind and leisure to push investigation into the lay and dip and bearing of their ore-deposit, and to prospect the continuations of it.

"The crude pig-copper produced was shipped to Baltimore —some 200,000 pounds—and being refined proved soft and good in quality, as did also that from the New Mexico mines. This is due to the fact that neither antimony, arsenic, nickel, nor tin occurs with the ores of the region.

"While this mountain of ore should prepare us for surprises in that locality, it is totally eclipsed by the Coronado mines, some three miles west of the Longfellow, and discovered by the party working the latter. The discovery had been kept secret until the land had been cut off from the Indian reservation by the President of the United States, and restored to the public domain. This fact being advised by telegraph and swift expresses, a relocation was made by the discoverer, thus securing a virgin title that can never be disturbed.

"Here we have a true vein, in a limestone and granite formation, cutting mountains and gorges 9,000 feet long as the crow flies, and probably much longer, as a mountain of green carbonates, some miles beyond, seems to lie in the same direction. Gay-colored croppings of carbonate plainly define and picture out the course of the vein. Six different names had to be given to the successive locations, viz: Boulder, Horseshoe, Coronado, Copper Crown, Crown Reef, Matilda. The width of croppings varies, averaging thirty feet, widest 135 feet, and narrowest two feet at the commencement, which is in Twin Cañon. The vein runs along both sides of the cañon, plainly visible here, of solid red oxyd, then ascends the mountain on both sides, one of them rising 1,000 feet perpendicular, trial-pits showing copper-glance in limestone and other ores of copper along the whole course of the vein for over 13,000 feet superficial. The main work has been done on the Horseshoe, where the croppings are wide, specimens from the whole width of which, carbonates, assayed over fifty per cent. An adit was here cut fifteen feet below outcrop, the bottom of which was found to be solid copper-glance for twenty feet into the vein, being as far as the work was carried up to the time of my envoy's departure. Curiosity prompted him to turn the adit into a wide open cut, and he found that the smaller veins cropping out had at the depth of fifteen feet already run together into one vein, and to all appearances this may continue for the whole width of 135 feet. This show is enormous, almost incredible, but there it now lies bare, ready for anybody's inspection. Enough has been done to show a gigantic ore-course, bared in the cañon at 1,000 feet below the highest point, and the same ore shows everywhere. The general course of the vein is northerly, but it varies much from a straight line, and at one point is covered for 600 feet by a land slide.

"Thus far the cost of mining and smelting has been five cents per pound of copper, and the transportation to Baltimore six cents per pound. The distances are: From Clifton to Silver City, one hundred and twenty miles; Silver City to Las Cruces, one hundred and fifteen miles; from there to terminus of railroad in Colorado, six hundred and fifty miles. This distance will be shortened as the railroad progresses toward Santa Fé. All these are mail-routes, but the merchandise is transported during eight months of the year by ox and mule transportation, which take copper as return freight at four to five cents, and extra at six cents per pound. The Coronado Company, however, contemplate running a train sufficient to carry two million pounds of copper to market."

One mercantile firm in Mesilla, New Mexico, alone, during a recent period of twelve months, imported 1,000,000 pounds of merchandise, and exported 1,500,000 pounds of copper and 50,000 pounds of wool. A member of the firm is examining into the Texas route, via Austin, with a view of shipping by it at a lower rate than by El Moro, in the same territory.

The history of coal explorations and discoveries in Arizona is one of peculiar interest; and the recent extensive discoveries of coal in the Territory were alone wanting to make Arizona without its peer in the United States, as regards a combination of mineral, agricultural, and other natural gifts. From Lieutenant Wheeler's Report of Explorations, in 1871, and accompanying documents, it appears that prior to that date Dr. Newberry had discovered indications of coal on the Colorado Plateau; and Lieutenant E. E. Howell says: "If the thick beds of lower cretaceous coal reported by Dr. Newberry do indeed belong to this same horizon, then the lower cretaceous coal of the Colorado Plateau system is the most extensive known"; and the "if" can now almost be dispensed with. Coal was seen by members of that expedition on the north fork of the Virgin River, near the north-west corner of the tertiary strata; on the west fork of the Paria, near Paria, Utah; twenty-five miles west of Oraybe, (one of the Moqui villages) at the mouth of a little cañon (110 deg. long., 36 deg. 20 min. lat.) there was a bed of pure coal eight and a-half feet in thickness, and a little farther down the cañon a lower bed four to five feet in thickness; two or three miles north one bed twenty-five feet in thickness, supposed to be the same mentioned by Dr. Newberry; there were also seen at the Moqui towns and east of Mount Taylor, "enough to indicate that the bed continues, with greater or less thickness, to the valley of the Rio Grande." "The coal beds are included in the shale; whenever there shall be a market, coal will be developed in all the indicated areas of cretaceous outcrop." A coal opening was also seen sixteen miles north of Camp Apache; four seams of coal four to five and a-half feet in thickness were seen twelve miles west of Fort Wingate, New Mexico, and again at the north-west slope of the White Mountains. Some distance to the southward of this last, is the coal region of Arivaipa Cañon, discovered this Fall by Philip Kohlheyer and Charles Blackburn, which has been laid off into five claims of 320 acres each. These strata are horizontal, in a sandstone formation; and when the railroad reaches the vicinity, the coal here (evidently anthracite) will be invaluable for mining and manufacturing developments in Pinal, Maricopa, and Pima counties. A vein of good coal is said to have been discovered about fifty miles from Mesilla. More anthracite coal is reported "in the near neighborhood with silver mines in the hills of the Salt River Valley," of which a mass is said to have been exposed 120 feet in width and a mile in length, but no more definite location is stated.

Mr. Charles P. Stanton, vouched for as a competent geologist, published in the Prescott *Weekly Miner*, under date of November 9th, an interesting communication relating to the coal fields of Yavapai County. He claims that nearly or quite 88,000 square miles of coal formation are to be traced; so that nearly one-half of the whole coal measures of the United States are embraced in this Territory. Mr. Stanton says: "The eastern edge of this great Tertiary Basin commences at Tierra Ausarilla, and runs south to Santa Anna, New Mexico. The beds vary in size from two inches to twenty feet. Close to Fort Defiance, in Yavapai County, a vein exists nine feet thick. I conveyed to the blacksmith shop at that agency, in 1873, one hundred pounds of this coal, for the purpose of experimenting on its qualities for welding iron, which it readily did. I spent two days at this blacksmith shop burning this fuel, and it seems to me to possess all the qualities of excellent bituminous coal, and to rank next to anthracite for domestic purposes. It is as neat as anthracite, leaving no stain on the fingers. It produces no offensive gas or odor, and is thus superior in a sanitary point of view; and, when brought into general use, it will be a great favorite for culinary purposes. It contains no destructive elements, leaves very little ash, no clinkers, and produces no more erosive effects on stoves, grates, or steam-boilers than dry wood. I see no reason why it should not be preeminently useful for generating steam and for smelting ores. This description will apply to all the coal in this great Arizona Coal Basin, with but few exceptions. It is in the paleozoic lower tertiary, and lower silurian sandstone, and calciferous sand-rock, with areneaceous clay, and in some places dark cretaceous clays, with red hematite and spathic iron ores. Close to the western base of the dizzy peak, or butte, on which the Moqui Indians have erected their village, is another immense bed of coal. * * * It rests on a bed of carbonaceous clay, and in the clay are nodules of iron ore, full of impressions of deciduous leaves, with an abundance of small bivalves and other shells.

"The next great bed of coal encountered * * * is situated about twenty miles northwest from the Moqui villages, and close to the northern verge of the Painted Desert. * * It is twenty-three feet thick, and boldly crops out for a distance of three miles. This coal is close, compact, and close-burning, melts and swells in the fire, and runs together, forming a very hot fire, and leaves little residuum. It resembles, in external appearance, the Pennsylvania bituminous coal. It is, however, very hard to ignite. * * * The trend of the coal beds is north and south, and overlying this great deposit is drab clay, passing up into areno-calcareous grits composed of an aggregation of oyster shells, * * with numerous other fossils, which must have existed in this great brackish inland sea, about the dawn of the tertiary period, probably in the eocene age.

"In this great Arizona carboniferous basin there is not a square mile in which the coal does not crop out on the surface, varying in size from two inches to twenty feet. This, no doubt, is owing to the tremendous drift erosion which has taken place here at a comparatively modern date—either miocene or pliocene age. The paleozoic, mesozoic, and cenozoic times, with their triassic, jurassic, cretaceous, tertiary, post-tertiary, upper and lower silurian, eocene, miocene, and pliocene periods, are in this great carboniferous basin tumbled and crumbled together, in indescribable confusion, so much so that twenty geologists would fail, during the collective labors of their lives, to fully expose and elucidate the subject. What the great synchronous causes were is beyond my comprehension. I have seen here petrified forests of great extent and silicified trunks of trees of gigantic proportions. I have no doubt that in some of the synclinal valleys of this great region oil will be found in great abundance."

In the best characteristics of true fissure veins, the metal-bearing veins of Arizona are probably unexcelled and rarely equaled elsewhere. The character of the wall rocks is so varied that experiences elsewhere, in and of themselves, suggest doubts as to permanency not warranted by experience here. The ores of Yavapai County so strikingly contrast with others that experienced men from other mining regions are unable, by appearance, to discriminate poor ore from rich ore. Minerals, obeying the universal law of progression, seek by natural selection to assume arborescent forms, electric or magnetic forces playing a most important part in those great realms of unexplained phenomena pertaining to the production and concentration of our gold and silver veins and deposits. The action of water sets free the metallic particles, which permeate by infiltration or specific gravity into porous stratifications, fissures, and alluviums, and then attempting to assume arborescent or crystalline forms, after assuming which they are decomposed by the action of gases and acids into the combinations as we now find them. At the water line the ore usually changes its character. As illustrating this theory—in the Timber lode, Leeds District, Utah, where the formation is in sandstone fifty feet deep, petrified limbs, tree trunks and shrubbery are found in the lode itself, some of which are covered with horn silver, certainly not ejected from the earth. To the mineralogist and geologist the subject offers a field of rare and attractive investigation. The following table, prepared especially for this work, and based on such authorities as Lieutenant Wheeler's reports, the annual U. S. mineral reports of Professor Raymond, etc., the writings and reports of such savans and explorers as Ehrenberg, Pumpelly, Kustel, Brunckow, Poston, W. G. Boyle, Professor Rickard and others, must prove of value. It is of course quite imperfect, but is believed to be correct as far as it goes:

Mineralogical Table of Arizona.

	ELEMENTS.
Copper, (native)	Rio Francisco, Aztec District, Santa Rita Mountains.
Silver, (native)	Cerbat Range.
Gold	Pinal Range, Wickenburg, Rio Francisco, Fort Bowie.
	SULPHIDES.
Pyrite	Aztec District, Santa Rita Mountains, Cerbat Range, Hualapais District.
Sphalerite, (zinc-blende)	Cerbat Range, Aztec and Tyndall Districts, Santa Rita Mountains.
Galenite	Wheatstone Mountain, Hualapais District, Aztec and Tyndall Districts, Santa Rita Mountains.
Chalcocite, (copper-glance)	Rio Bonito, Rio Francisco, Turnbull Peak, Hualapais District, Aztec District, Santa Rita Mountains.
Covellite, (blue copper)	Rio Francisco, Aztec District, Santa Rita Mountains.
Chalcopyrite	Hualapais District.
Argentite, (silver glance)	Aztec and Tyndall Districts, Santa Rita Mountains.
Stembergite, (iron and silver sulphide)	Aztec District, Santa Rita Mountains, Rio Francisco.
Pyrargyrite, (ruby silver)	Pioneer and Globe Districts. Hualapais Range, Santa Rita Mountains, Bradshaw Mountains.
	METALLIC OXYDS.
Hematite	Colorado River, Rio Francisco, Cerbat Range.
Limonite	Rocker Creek, Dos Cabezas.
Menacanite, (titaniferous oxyd of iron)	Dragoon Mountains.
Pyrolusite, (peroxyd of manganese)	Tyndall and Aztec Districts, Santa Rita Mountains.
Massicot	Santa Rita Mountains.
Minium	Santa Rita Mountains, Castle Dome, Hualapais District.

OXYDS—*Continued.*

Cuprite, (red oxyd of copper)	Rio Francisco, Aztec District, Santa Rita Mountains.
Stetefeldite	Aztec and Tyndall Districts, Santa Rita Mountains.

CHLORIDES.

Cerargyrite, (chloride of silver)	Prescott, Aztec, and Tyndall Districts, Santa Rita Mountains, Hualapais District.
Embolite, (bromo-chloride of silver)	Aztec and Tyndall Districts, Santa Rita Mountains.
Chlorides of calcium and magnesium	Rio Francisco.

CARBONATES.

Carbonate of soda, (Trona)	Prescott, Dragoon Mountains.
Calcite	Camp Apache, mouth of Paria Creek.
Cerussite, (carbonate of lead)	Santa Rita Mountains, Castle Dome, Yuma Co., San Xavier District, Pima Co.
Malachite, (green carbonate of copper)	Rio Francisco, Gila Bonito Creek, Rio San Carlos, Turnbull Peak.
Azurite, (blue carbonate of copper)	Rio Francisco, Aztec and Tyndall Districts, Santa Rita Mountains.

SULPHATES.

Sulphate of soda	Santa Catalina Range, Dos Cabezas, Sunset Crossing.
Sulphate of magnesia	Santa Catalina Range.
Gypsum, (sulphate of lime)	Wheatstone Mountains, Sunset Crossing, Cañon Butte.
Sulphate of copper and iron	Santa Rita Mountains.

NITRATES.

Nitre	Cosnino Caves.

SILICIC ACID.

Agate	Rocker Creek, Aztec District, Santa Rita Mountains.
Jasper	Colorado-Chiquito, Navajo Reservation, Moqui villages, Santa Rita Mountains.
Flint	Painted Desert.
Opal	Chevelon's Fork.
Chalcedony	Cerbat Range, Cordillera del Rio Gila, San Carlos Creek, Santa Rita Mountains.
Amethyst	
Silicified wood	Navajo Reservation, Painted Desert, Sunset Crossing.
Quartz crystals	Santa Rita Mountains, Cerbat Range.

SILICATES.

Garnet	Black Cañon.
Orthoclase	In large crystals in the Dragoon Mountains, Pinal Range.
Sanadine	Camp Apache, Caliuro Range; Cottonwood Island and Black Cañon, Colorado River; Blue Ridge Mountains, Detrital Valley.

	SILICATES—*Continued.*
Pumice Obsidian	Rio Gila, Peloncillo Range, Bill Williams' Mountain.
Biotite	Graham Peak.
Muscovite	Pinaleño Range, Hualapais District.
Amphibol	Graham Peak, Santa Catalina Range.
Chrysocolla	Rio Gila.
Talc	Santa Rita Mountains.
Kaolinite	Rio Gila, Rio Francisco.
	ORGANIC COMPOUNDS.
Wheelerite, ($C^5 H^6 O$)	Navajo Reservation.
Bituminous coal and lignite	Camp Apache, Moqui villages, Colorado-Chiquito, East Pima County, near the Gila Cañons.
	ROCKS.
Granite	Pinaleño Range, Pinal Range, Dragoon Mountains, Santa Catalina Range, Grand Cañon, San Prieto, Cerbat, Ranges near Prescott.
Syenite	Chiricahui Range.
Gneiss	Cerbat Range, Graham Range, Grand Colorado Cañon, Black Mountains, Camp Bowie, San Prieto, Santa Catalina Range, Santa Rita Mountains.
Quartzite, (massive)	Turnbull Peak, Sierra Ancha, Cañon Creek, Mogollon Mesa, Camp Bowie.
Mica schist	Pinaleño Range.
Primitive clay-slate	Pinaleño Range.
Sandstone	Moqui villages, Painted Desert, Aubrey Cliffs, Grand Colorado Cañon, House Rock Plateau, Tres Hermanos Basin, Chevelon's Fork, Big Dry Fork, Black Cañon Range, Rio Colorado, Detrital Valley, Santa Rita Valley.
Limestone:	
1. Paleozoic	Bowlder Cañon, Rio Colorado, Santa Catalina Range, Dragoon Mountains, Big Dry Fork, Chiricahui Range, Camp Apache, San Francisco Plateau, Grand Cañon, Kaibab Plateau, Kanab Cañon, Sheavwitz Plateau, Santa Rita Mountains.
2. Cretaceous	Ojo del Oso.
	ERUPTIVE ROCKS.
Rhyolite	Caliuro Range, Peloncillo Range, Rio Francisco, Postal's Ranch, Truxton Springs, Cerbat and Hualapais Ranges.
Trachyte	Cordillera del Rio Gila, Rio Benito, Colorado Range, Sierra Blanca, Black Mountains, Mount Floyd, Mount Sitgreaves, Mount Kendrick.
Basalt	Mogollon Mesa, Camp Apache, Cañon Butte, Sunset Tanks, Dog Buttes, Point Lookout, Peloncillo Range, Triplets, Black Hills, Truxton Springs, Mount Davis, Cerbat Range, Black Cañon Range, Rio Colorado.
Volcanic tufa and conglomerate	Caliuro Range, Triplets, Black Cañon Range, Rio Colorado, Gila Valley, Sierra Cabeza, Prieto.
Lava	Black Cañon Range, Rio Colorado, Sierra Cabeza, Prieto.

The following is an extract from a recent editorial in the Los Angeles *Herald:*

"We doubt if any portion of the United States shows more signs of movement, everything being considered, than Arizona does to-day. It is felt in mining circles that the Comstock lode will not much longer engross the attention of investors. In fact, it is known that it no longer does so engross it. There is now daily passing through Los Angeles an unobtrusive but valuable class of people, who go to Arizona with the intention, if the indications should warrant it, of putting money and energy into the development of the mines of that Territory.

"We have felt a keen interest in the opinions formed of Arizona as a mining section, and we have neglected no opportunity of familiarizing ourselves with those formed by intelligent prospectors. These nearly all come and go via Los Angeles, so that our opportunities for collecting the general judgment have been excellent. We have availed ourselves of them ever since we took up our residence in Los Angeles, about three years since. Then, almost every prospector one struck had a different estimate of the mining outcome of Arizona. Fully one-half of those who had made any detailed examination of the Territory were distrustful of the outcome. Very different is the present testimony. All classes unite in the opinion that Arizona is wonderfully rich, that deposits of the precious metals abound almost everywhere, and that, even in the present year, the shipments of bullion will be quite extensive. We risk nothing in assuming that more bullion is shipped from the Territory now in a single month than was shipped in a twelvemonth, two years ago.

"Now is undoubtedly the golden time for investment in Arizona. Interests can be acquired now for comparatively little money which will command fancy figures a year hence. This offers a capital opportunity for men of experience and means."

We now come to a question as difficult as it is important; that is, the amount of production in Arizona of gold and silver, on which estimates widely differ. Mr. Raymond, in his "Mineral Resources" for 1875, had estimated the production in Arizona, for 1874, at $487,000, basing that estimate largely on detailed reports; and that of New Mexico at $500,000, which the citizens of the last named Territory considered too low. The superintendent of Wells, Fargo & Co.'s Express Company, Mr. Valentine, estimated the product for 1875 at:

Gold dust and bullion by express..................	$23,500
Ores and base bullion by freight..................	85,593
Total....................................	$109,093

On which Mr. Raymond remarks: "That this is ridiculously low, no one who knows how many men are mining in Arizona can for a moment doubt." It is certain that at that time, and for some time subsequently, there were no express offices in Arizona; that bullion was largely taken out of the Territory privately and by mail; that considerable silver was contained in shipments of copper and lead ore, of which silver no account would appear, except in the returns of the mines; and further, that considerable bullion was, and is, shipped via New Mexico, for which Arizona gets no credit. It would, therefore, appear that at that time the express company had no great facilities for obtaining information; and that, even now, the greater part of the gold and silver produced do not go by express. John Wasson, Surveyor-General of the Territory, estimated the product for 1875 at $1,500,000. A recent estimate places the product of Arizona for the present year at $1,500,000 silver, and $500,000 gold. With a view to determine this point, the following monthly products of a few of the leading mines are tabulated:

Stonewall Jackson, and other mines owned by same company	$100,000
Peck	50,000
McCracken	75,000
Signal	80,000
Tip-Top	75,000
Silver King	30,000
Warsaw (Oro Blanco District)	37,000
Total	$447,000

Or $5,364,000 per annum from seven of the leading mines. Other mines in Mojave County in the aggregate probably equal $1,750,000 more, or an aggregate of over seven millions for all of Mojave County, and a few of the leading mines elsewhere, leaving out hundreds of rich mines in the other five counties. The estimate for Nevada this year is $50,000,000; and it needs no Sutro tunnels, or other expensive schemes, to get out twice that amount in Arizona, with half the capital, one-fourth the labor, and one-third the cost. When the insane policy of depreciating our own product to the ruin of the nation, in order to further the schemes of European financiers and American speculators, is put down, (as it must be at any cost) the business of silver mining will receive a further impetus, inasmuch as we urgently need as currency to-day more than six times the annual product of all the silver mines of the United States.

The following is a list (probably incomplete) of the new quartz mills purchased or erected in Arizona within the six months ending October, 1877, viz:

	Stamps.
Champion (steam drop)	2
Townsend & Co. (5 already up)	10
Signal	10
Hackberry	10
Dean	10
Masterson's Turkey Creek	5
Silver King	5
Peck (originally Black Warrior)	10
McCracken	20
Walnut Grove (10?)	5
Knowles (Empire Flat)	10
Total	97

Some of those previously in operation are as follows:

	Stamps.
Ostrich	10
Tidwell	3
Frederick's	10
Mineral Park	5
Greenwood	10
Morrill & Ketchum	6
Aztlan	5
Constancia (now Luke's)	10
Crook (10?)	5
Bill Smith's	10
Vulture	40
Cormorant	5
A few mills in the Hualapai District, not specified, estimated at	15
	134

At the low estimate of $1,000 per stamp per month, (and some run as high as $8,000) the mills above recorded would make $2,772,000 of bullion per annum. This is exclusive of smelting works, of ore shipped for reduction elsewhere, and of very large quantities on the "dumps" awaiting expected facilities for reduction. But these mills are entirely inadequate for the purpose. Mills and smelting works are still urgently needed in every mining district; and with competent managers are certain to pay a liberal percentage on the capital invested, if used wholly for custom work, where no risk is possible except such as might result from a failure of all the mines within convenient distance. If capitalists will invest money in such enterprises as these, bringing solid and certain returns, it would not only be far more desirable for the community, but better for themselves than when put into stocks, land-grabs, and other forms of respectable gambling. Gold, silver, copper, lead, iron, wood, coal, a bracing climate, a fertile soil, irrigating facilities over a large area only needing development — these constitute a combination of natural resources only needing roads, capital, and labor to make Arizona the richest State in the Union.

CHAPTER V.

MINES, MILLS, AND LOCATIONS.

DESCRIPTION OF MINES, ETC., IN THE SEVERAL COUNTIES. YAVAPAI COUNTY; COMPARISON WITH SOUTHERN ARIZONA; MINERALS AND DISTRICTS NEAR PRESCOTT; CHARACTER OF ORES; LOCATORS; TOWNS AND MILLS. COPPER MINES AT CLIFTON; COAL; LIST OF LOCATIONS IN YAVAPAI COUNTY. PIMA COUNTY; THE SANTA CRUZ VALLEY; OLD MEXICAN WORKS; MINING DISTRICTS; COPPER, GALENA, AND ARGENTIFEROUS ORES; COAL; TABLE OF MINES IN PIMA COUNTY. PINAL AND MARICOPA COUNTIES; PIONEER AND GLOBE DISTRICTS; MINING CAMPS AND TOWNS; DESCRIPTIONS AND LOCATIONS; VALUABLE INFORMATION; SILVER KING; GLOBE; STONEWALL JACKSON; VULTURE MINE; COPPER LODE; TABLE OF MINES IN PINAL AND MARICOPA COUNTIES. YUMA COUNTY; FIRST AMERICAN MINING; CASTLE DOME; WEAVER; HARCUVAR; COST OF LABOR AND LIVING; LIST OF MINES. MOJAVE COUNTY; MOUNTAINS; SETTLEMENTS; MINERALS AND MINES; TABLE OF MINES.

While the mining wealth of Southern Arizona was known centuries ago, even to races which, in respect of written records, are pre-historic, that of the north (that is, as far as settlements have yet extended) dates in the main from 1857 to 1863, in which latter year the Weaver diggings were found by American explorers arriving from the Colorado river and the Pima villages. Subsequently ascending the Hassayampa, one of these explorers, in the winter of 1863–4, reached Lynx Creek at about ten miles east of Prescott. In 1866, Mr. Ehrenbergh (who discovered the celebrated Vulture mine) predicted the results of future developments when he wrote that there was "a continuous range of gold-bearing rock from near Wickenburg to ten miles north of Prescott, and from the Lower Hassayampa to the Agua Fria, which would embrace an area of at least one thousand square miles. The containing rock is nearly the same in this entire section." And in the tract thus designated, the mining districts and mine locations are now more numerous than in all other parts of the Territory combined; not because of its intrinsic superiority, but because in past years it could be protected with less difficulty from Indian attacks, and was less liable to Mexican depredations. Hence a comparative concentration of population, with its accompanying facilities. Up to October 1st, 1876, of 11,605 mines located, and recorded in the Territory, 7,298 were in the county of Yavapai; but the proportion is probably much less at the present time, and will continue to diminish as the causes which once impeded the development of the generally richer southern mines pass further back into history.

In the vicinity of Prescott the general direction of the mountain ranges, quartz veins, and dikes trends from north-west to south-east. The country rocks are metamorphic slates, feldspathic granites of various tints, veins of epidote and hornblende, quartzites and white quartz stained with oxyd of iron. These last are very prominent, of great length and width, but rarely carry any precious metals. These veins are in most instances barely outcropping upon the tops of the rounded hills, but easily traced by the float. In some localities trap rocks and metamorphic slate dikes are very prominent. In the vicinity of the slate formations the principal metal-bearing veins are to be found, the metal veins usually running parallel, in a few instances only crossing at nearly right angles. Volcanic trap rock and scoria lie scattered over the table lands or mesas, disintegrated, then washed away, leaving the rounded foothills with their primitive characters but slightly disturbed. The alluvial detritus was washed into the valleys, impregnated with alkaline salts and vegetable matter, forming a dark, rich mold, and producing splendid crops. Gold has been found in nearly every locality in Yavapai county wherever diligent search has been made, both in veins and in bars and gulches. It is noticed that the lodes when first opened carry a good percentage of gold, but at a greater depth run into or carry a large per cent. of silver. It is found also in the granitic, feldspathic, quartzose, hornblendic, slate, and talcose rocks, free and intimately mixed with various sulphides, often in beautiful crystals of the octohedral form; wire gold has been found; also scales and nuggets of respectable size.

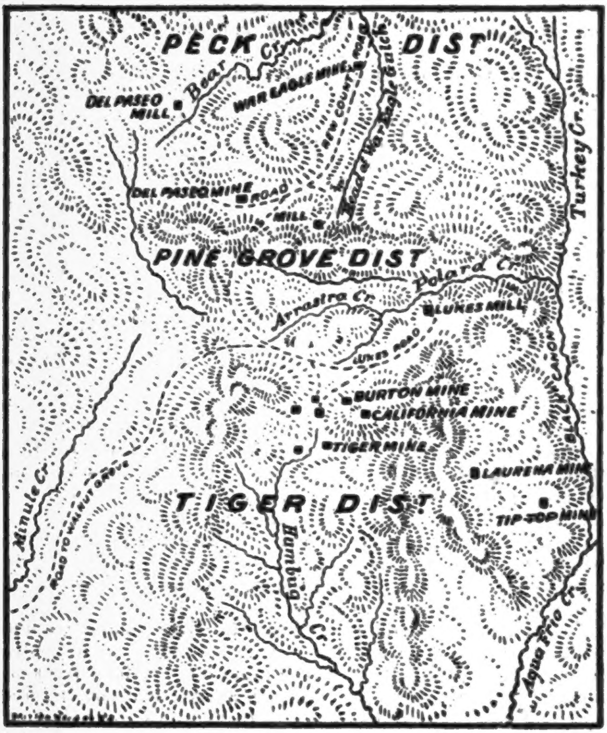
Silver occurs, native, in various lodes, in tangled wires, arborescent filaments and in nuggets; also, as horn silver, chloride, chloro-bromide, as sulphide associated with lead, iron, antimony, zinc, etc. The Black Warrior lode has produced beautiful specimens of wire silver; also, the Peck, Silver Prince, Tip-Top, Silver Flake, Kit Carson, Lone Star, Little Tiger, and others. The Sumner lode produces a new combination of ore. The principal vein matter is micaceous iron, iodide of silver, gold, sulphurets of iron, and antimony. The name Arizonite has been given to it by Mr. H. G. Hanks, of San Francisco. Horn silver from the Peck lode has been found in crystals, assuming the forms of the cube, and with corners truncated, tetrahedral, dodecahedral and hexagonal, and in masses weighing several pounds. Ruby silver of beautiful color has been discovered in several districts.

Many valuable lodes of copper are found, some of the red oxyds assaying as high as eighty per cent.; some producing metallic copper in nuggets and in the dentratic form; also, malachite, blue and green carbonates and alacamite as a muriate, as silicate, also as sulphides and oxyds. Gray copper is found in Black Warrior and many other lodes.

Lead is found in abundance as a sulphide and carbonate—rarely as a sulphate; it is found in crystals in the Peck lode; chromate and phosphate in beautiful crystals from the Lone Tree lode, as molybdate and wulfenite, from the Accident lode, Lynx Creek district; oxyd and chloride of lead abundant in many lodes, and usually carrying silver, and sometimes gold. Zinc, as a sulphide, reddish, brownish red, white and black. It is not very abundant as an ore. Antimony is found as a sulphite disseminated through most of the galena-bearing veins. No zinc or quicksilver ores have as yet been discovered. Iron is abundant as sulphide, carbonate, hematite, chromate, and oxyd. Manganese, as an oxyd, is abundant, and also as manganite. Rock salt can be found in immense deposits, massing near Verdi, and excellent for milling purposes. No complete analysis has been made, but I judge it fully eighty per cent. chloride of sodium. Other alkaline soil deposits are found in various localities, by utilizing which sufficient can be obtained to supply our necessities. Gypsum is quite plenty in several localities. About two miles from Prescott there is a good deposit; also beds in other localities. Kaolin, gypsum and alabaster are plenty near Walnut Grove. Limestone is plenty in various localities. Fire-clay has been found in several localities.

Of the mining districts in the vicinity of Prescott, the Weaver is the oldest, the most distant, and the most isolated from the others, its center being almost fifty miles south-west from Capital. At Antelope hill is a station, store, and hotel; three miles south of it is Weaver, where there are placers usually employing about one hundred Americans and thirty Mexicans. The claims, on account of the richness of the ground and consequent great demand, have been recently cut down to 200 feet square. One man is said to have recently taken out $500 in one day. On the summit of Antelope hill —which is about 2,000 feet above the surrounding valleys, twenty-eight miles north of Wickenburg, and near the Prescott road—there is a slight depression, where, in 1863, was discovered a very rich deposit of gold in nuggets, supposed to have been washed from the quartz ledges. Placer mining in this district would be (as it once was) very extensive but for the deficiency of water; and "great expectations" are here indulged in, contingent on improvements in dry washers. Several lodes are worked in the Weaver district. The Sexton mine, on Antelope hill, and about fifty miles south of Prescott, is remarkable for its immense croppings, which yield $15 a ton. The vein below the surface is over ten feet in width, and the rock is so much decomposed that, though the ore is not high grade, it will be quite profitable, because easily worked—it being estimated that ten stamps would reduce fifteen tons in twenty-four hours.

The other districts near Prescott are in a compact form. The most southerly, the Humbug District, reaches almost to the northern line of Maricopa county; its south-western corner is about twenty miles east of Wickenburg; it is east of Silver mountain and Castle creek, between Humbug creek (which heads in the Bradshaw) and the Agua Fria, the source of which is in Lynx creek, near Prescott. Less than three years ago the first location was made; now it contains several rich mines, for one of which $40,000 is reported to have been offered. The surface is undulating, and the formations are very different from those of the Peck, Turkey Creek, Lynx Creek, and Hassayampa districts, consisting of micaceous, decomposed granite. Huge dikes, miles in length, of whitish granite quartzite, showing scales of mica sometimes two inches square, glittering in the sun like burnished silver, run across hill and dale from south-west to north-east, lying parallel at distances 100 feet to 1,000 yards apart; and between these are the veins of quartz carrying the precious metals. Assays, as reported from ten mines in this district, average over $1,000 per ton, ranging from $370 to $2,000. Products are respectively reported at $100, $440, $500, (two) $513, $550, and $670 per ton, in some (perhaps in all) from selected ore. One mine assays *on the surface* $26.38 in silver, and $180.48 gold; and of another the estimate of surface product is $400 per ton. Mr. Pfister, assayer for the Tip-Top Company, states that the average of ore brought to him for assay by prospectors (with which the district is rapidly filling up) is $400 per ton. In the "Tip-Top" mine a streak of ore has recently been struck over twelve inches in width, assaying $11,000 per ton, and no change has appeared on it for twenty-one feet. The number of mines reported by name (see table) is thirty-seven.


PECK DIST
Bear Cr.
DEL PASEO MILL
WAR EAGLE MINE
NEW COUNTY ROAD
Head of War Eagle Gulch
DEL PASEO MINE
ROAD
MILL
Turkey Cr.
PINE GROVE DIST
Polard Cr.
Arrastra Cr.
LUKES MILL
LUKES ROAD
BURTON MINE
CALIFORNIA MINE
TIGER MINE
LAURETTA MINE
BLACK CAÑON
TIGER DIST
TIP-TOP MINE
Minute Cr.
ROAD TO WALNUT GROVE
Humbug Cr.
Agua Frio Cr.

Immediately to the north of the Humbug district is the Tiger, or Bradshaw district. Placers were worked here by the Mexicans for several seasons prior to 1864, when quartz claims were first taken up. The Nopal, Ballenciana, and other lodes, still in operation, were worked by arrastras in 1869. The "Tiger" was discovered some years ago by D. C. Moreland. About eight extensions are now located immediately adjacent on the same lode, the actual product of which ranges from $50 to $300 per ton. The product of other mines in this district is reported at (respectively) $30, $60, $70, $85, $90, $150, $300, and $464 per ton; and two assay $200 and $250. The total number in this district recorded by name in the table is about thirty.

The Pine Grove district, of Yavapai county, (there is also a district so named in Pinal county, more recently christened "Randolph") is immediately north of the Tiger, and south of the Peck district. But two mines—the Kentuck and the Knickerbocker—are reported by name as in that district.

The Peck district was defined on October 23rd, 1875, as "commencing at the mouth of Poland creek at its junction with Turkey creek; thence running up Turkey creek to the mouth of Bear creek, to where Battle creek empties into it; thence up the ridge to the top of the same, between Bear creek and Battle Flat creek, to top of Bradshaw mountain at the head of said ridge; thence running due south to Poland creek; thence down Peck creek to place of beginning." From the Peck mine ore to the amount of nearly a million dollars in value has been extracted, and it is now producing $50,000 per month; its ore averages $460 per ton, and assays up to $17,600. The "Silver Prince," on a parallel lode, produces $250 per ton on unsorted ore; the "Black Warrior," in the same district, $100; the Wallace ledge, owned by the Peck Co., assays from $90 up. Fifteen other mines are reported by name, apparently new, no details being given as to their product.

Alexandra is the name of a town site that has recently begun to spring up in the vicinity, on which several thousand dollars have been expended in grading the streets, and in the construction of a fair stage road to Prescott.

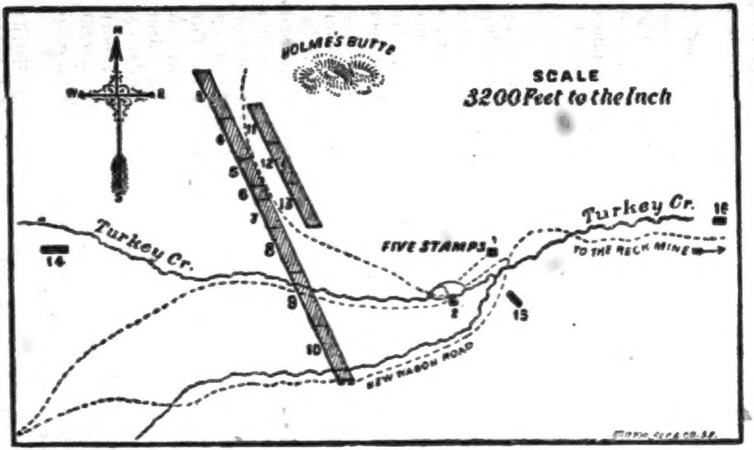
The Walnut Grove district, on the Rio Hassayampa, bounds the Tiger, Pine Grove, and Peck districts to the west, its southwestern corner being about fifteen miles due north of Wickenburg. It contains some good mines, is an excellent farming district, and otherwise well situated as to facilities for reduction and mining. A five-stamp mill was brought to the district by J. Hœffler in July, 1877; and to the "Crescent" mine is attached a smelting furnace that gets through with thirty tons of ore daily, yielding twenty to one hundred dollars per ton in silver and twenty to forty-five per cent. lead. Twenty to forty men are employed at this mine and furnace. Another mine in the district yields seventy-five to one hundred dollars per ton. At the "Placeritas," (Little Placers) between Walnut Grove and Peeple's ranch, gold was extracted by Mexicans in 1868–9.

The Hassayampa district is about thirty miles in length from east to west, but only about five miles in breadth. It crosses the Sierra Prieta range, and at one point is quite near Prescott. The head waters of the Hassayampa are near those of Lynx creek; and the whole range from those head waters and west of Lynx creek is believed to be one continuous mineral belt. A number of locations have recently been made.

The "Senator" mine, to which a ten-stamp mill is attached, has on the dumps about $50,000; the assays are eighty-five dollars per ton gold. The ores of the "Gen. Crook" and "Empire" gold mines are worked by a five-stamp mill, and yield fair returns. Of the thirteen other mines in this district named in the table, nothing definite as to yield or assay is reported.

The Big Bug district is eastward of the Turkey Creek district; its mines are numerous and productive. Placers were worked here as far back as 1863–4 by American miners, who, on exhausting them, found no lack of quartz veins. Every hill in this district is mineral-bearing. The country rock is greenstone and slate; the vein is brown quartz. Mr. Ehrenberg visited this district in the summer of 1866, and minutely examined two of the mines in it—the Big Bug and the Eugenia. His estimate was favorable, though at that time they had not been much worked. In 1868–9 the Big Bug yielded $30 per ton, and the Eugenia $25; the latter in arrastras. The first recent silver discovery in this district was named the "Silver Belt," before the singular appropriateness of the designation was realized; but it proves to be on the north-eastern terminus of a silver belt twenty miles in length by two in width; commencing at the Agua Fria valley, and running south-west through the mountains on the head waters of the Big Bug, Lynx, Turkey, and Hassayampa creeks, to Walnut Grove. Fire-clay—an invaluable and indispensable ingredient for furnaces (often scarce in Arizona)—is found in this mine. The products per ton of other mines in the district, in gold and silver, are reported respectively at $20, $60, $200, $122–$300, $300, $100–$600, $60–$200. Several mines have also lead, one galena vein cropping out a foot in height for several hundred feet.

The Turkey Creek district is a small but productive district to the east of the Hassayampa and north of Peck districts. The Goodwin mine was discovered by Gov. Goodwin in 1863, but not worked until the spring of 1877. It is stated to produce $300 per ton, and to assay as high as $1,130. Three other mines are reported as producing $250 to $300 per ton; and two more to assay $400 and $1,500. Six mines in this district were mentioned by J. Ross Browne in 1869, but two of which —the Goodwin and the Bully Bueno—are now in operation. There are some mills, and the table contains the names of about twenty-eight mines in this district.


N
W
E
S
HOLME'S BUTTE
SCALE
3200 Feet to the Inch
Turkey Cr.
Turkey Cr.
FIVE STAMPS
TO THE PECK MINE
NEW WAGON ROAD
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

1. Murat Masterson's Stamp Mill.
2. Kethro's Station, on trail to Peck mine.
3. Burmister's location, on Goodwin lode.
4. Masterson's location, on Goodwin lode.
5. Masterson, Collier & Hatz's location, on same. Locations 4 and 5 constitute the property owned by Goodwin Mining Company, organized in San Francisco.
6. Holme's location.
7. Levi Bashford's location.
8. Roach's location.
9. Collier's location.
10. Neagle's location.
11. *American Lode*, location 11, owned by McCurdy and J. N. McCandless.
12. McCandless location.
13. Herbert & Murphy's location.
14. Continental, owned by Barry & Cole.
15. Mulvenon & Roach's Smelting Works.
16. Bully Bueno Mill.

The Lynx Creek district, which lies immediately east of Prescott, attracted thousands of gold-seekers in the early days, commencing in 1863, and there is now a renewal of the ancient activity. The formation in the vicinity of the Zalida silver lead is very peculiar. The rock is of porphyry, granite, and slate, and runs north and south, while the ledges run at right angles to the general formation, the Zalida being in porphyry or slate dykes, whilst the Cora and Miriam are encased in slate close to a large quartzite iron dyke. Mines have been recently commenced at Monroe Springs, about sixty miles south of Prescott. The limits of the Prescott region are extending westward to the Santa Maria, and eastward to the Verde; also to the Mazatzal range, Groom, Willow, Agua Fria, Ash creek, and the Black Hills.

In the south-eastern portion of Yavapai county, near the line of New Mexico, is a copper district apparently inexhaustible in regard to quantity, the ore of which carries from thirty to fifty per cent. of metal. The country rock is granite, and the principal ores consist of carbonate and red oxyd of copper. Here are the Arizona, Central, Copper Mountain, Montezuma, and Yankee mines, for which water-power can be obtained in abundance from the Francisco river; for the supply of wood the facilities are equally great. Large quantities of the ore are at present shipped via Silver city, New Mexico, to the terminus of the Denver and Rio Grande Railroad (now about eight hundred miles from the mines), and thence to Baltimore; but inquiries are being made with a view of making shipments also via Austin, Texas, if that route should prove to be the cheaper of the two. Mr. Lezinski, one of the principal mine-owners, is reported as stating that if the Texas Pacific railroad were completed he would himself employ one thousand men at Clifton in copper mining; and probably ten times that number would be employed by others. It is probable that no copper deposits in the world excel this belt in quantity and richness, while for the working of the ore no natural facility is wanting.

Although the list of mines and particulars as to ownership, yield, etc., comprised in the following table, does not include over one-fortieth of the actual number, and is incomplete as to all the details desired, it may serve to convey some idea of the mineral resources of Yavapai county.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Accidental	Humbug	Odell & Norton	
Accidental	Near Prescott	Rice & Elliott	Shafts and two tunnels, 170 and 290 ft.
Adel	Hassayampa		
Antelope Mine	Weaver	Reed, Parsons & Co.	
Archer	Turkey Creek		
Ariel	Turkey Creek	F. W. Williams	
Atlantic	Pine Grove	Br. M. & M. Co.	30 feet
Aurora	Mazatzal	House & Rouse.	
Ballenciana	Bradshaw		
Bashford Claims	Turkey Creek	Bashford	
Basin	Humbug	J. Swelling, T. L. Bronson, Thos. Barnum et al.	
Beardslee Claim	Bradshaw		75 feet
Belle	Big Bug		
Belzora	Turkey Creek	Gould & Turner	
Benton	Bradshaw Basin		50 feet
Benjamin	Hassayampa		
Berry	Groom Creek	W. N. Kelley	
Berry	Hassayampa	Berry & Curtis	
Bertie	Turkey Creek	B. Neagle	
Biddle	Willow Creek	Biddle & Co.	
Big Bug	Big Bug	C. E. Hitchcock	
Big Gun	Walker Dist.		
Birthday	Hassayampa		
Bising	Humbug	C. A. Carpenter	
Black Warrior	Peck	Bonded by S. M. Wessels.	120 ft. shaft; winze and tunnel.
Black Jack	Humbug	Bostwick, Wager & Daugherty.	
Black Hills	Black Hills	Chas. Keyes, proprietor.	
Blandena	Bradshaw Basin		
Bonanza	Verde	Ruffner & McKinnan.	
Bonanza	Weaver	Cragico & Collins, Wessells & Gunning.	
Bonanza King		Disc. by B. F. Snyder.	
Bonanza, Little (see "Little Bonanza").			
Boulder	Clifton		
Box Elder	Walker		

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
...	...	...	Silver
8 arrastras, mill, 1 mile, 6 tons daily.	$30-$80 gold.	$30 silver, 30 p. c. lead.	Gold and silver; 2-ft vein; dis. in 1864; 16 men.
...	...	...	...
Arrastras ...	$90 ...	...	Weaver Gulch
Mill in dist. ...	...	...	...
...	...	...	New.
Luke's Mill close.	$60 ...	...	...
...	...	...	Silver.
...	...	...	...
In district ...	...	...	Next S. of Holmes' Goodwin lode; water.
In district ...	...	$1,000 ...	...
...			
...	$150 (?) ...	...	Ledge 5 feet wide; 3d ext. N. of Tiger.
...	...	...	Gold, silver, lead.
In district ...	$300 (?) ...	...	N. of and adj. Tiger; very wide vein.
...	...	...	...
...	...	...	...
...	...	...	Gold and silver.
...	...	...	Gold and silver.
...	...	...	...
...	...	...	Silver.
Near Isabella Mill.	$30 ...	...	...
...	...	...	...
...	...	...	...
In district ...	...	...	...
5-stamp to be erected.	$100 ...	$1200 to $4000	½ mile from Peck; 1st S. extension of Silver Prince.
...	...	...	...
...	...	...	Ore permeated with horn silver.
...	$85 (?) ...	...	2-ft. vein; 1st N. ext. of Benton
...	...	...	...
...	...	$27 ...	Auriferous quartz; ledge traceable 4 m.; pay streak 9 ft. wide.
...	...	...	Dis. in 1864; ledge in porph. granite.
...	...	...	Copper.
...	...	...	Mentioned by Ross Browne in 1869; now being worked

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Brunson & Barnum's.	Humbug		
Bulger	Big Bug		
Bullion	Big Bug		
Bully Bueno	Turkey Creek		
Burmeister Location.	Turkey Creek		
Burton	Tiger		
California	Tiger		62 feet
Casket	Cherry Creek, bet. Prescott and Camp Verde.		
Cayuga	Humbug		
Chapparal	Big Bug		
Chenango	Humbug		
Clauson & Miller	Humbug	Clauson & Miller.	
Clifton	Big Bug		
Clifton Copper	80 m. W. of Silver City, N.M.		
Clinton	Pine Flat, W. end of Bradshaw Basin.		
Cole Claim	Turkey Creek		
Collier Claim	Turkey Creek		
Concord	Peck	J. Tiedeman	
Continental Ledge	Turkey Creek		
Copper Crown	Near Clifton		
Coronado	Near Clifton	Wm. Grant, Supt.	
Corsican	Turkey Creek	R. H. Archer	
Cottonwood	Humbug		
Cougar	Peck		
Crescent	Walnut Grove.	Pinal Sil. M. Co.	
Cricket	Humbug	J. Swelling	30-ft. drift
Crook	Hassayampa	Fisk & Co	
Crown	Mazatzal	Derrick, Rouse & House.	
Crown Reef	Near Clifton		
Cumberland	Lynx Creek		
Davis	Hassayampa		
Del Pasco	2 m. N. of Bradshaw Basin.		
Dividend	Big Bug		
Don Quixote	Weaver	Pomeroy, Davidson & Co., W. H. Carter.	
Doyle	Peck		Shaft

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
	$500		2-ft. vein; 1 m. from Tip-Top.
			Gold, silver and lead.
			Gold, silver and lead.
10-stamp mill			Gold; named by Ross Browne in 1869, and now operated.
			2 claims N. of Collier claim, Goodwin Lode.
Luke's Mill near			
Luke's Mill near	$70 (?)	$200	¼ m. N. of Tiger; disc. locat'n.
			Gold and silver, free f'm sulph
In district			
Big Bug Mill near.	$22		1869; not known to be in operation.
In district			
In district			Gold and silver.
			Five men employed.
Furnaces			30 to 80 per cent. copper; 200 to 400 men.
Luke's Mill, in Basin.			Mentioned by J. Ross Browne in 1869.
In district			3d claim N. of Collier Claim, Goodwin Lode.
In district			On Goodwin Lode.
In district			Gold and silver.
			Copper.
			Copper croppings; 2-135 ft. wide.
Prospective		$100 to $500.	
Furnace, 30 tons daily.	$20-$100 silver		2-ft. vein; 20 to 45 per cent. lead; 20-40 miners.
Prospective		$1,500.	
5-stamp, at mine			
			Silver.
			Copper.
3 m. S. of Fredericks', 10-stamp.			Arg. galena; 15-ft. vein.
Del Pasco Mill near.			Gold.
Big Bug near.	$20		
	$200 (?)		2-foot pay streak.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Eclipse	Bradshaw	Dougherty	20 feet
Eclipse N. Extension	Bradshaw	Dougherty & Co.	
Eddy	Humbug		
Eladen	Humbug	Evans & Harris	
Empire	Hassayampa		
Eugenia	Big Bug		
Evening Star	Peck		
Fawn	Humbug	Tip-top Co.	
Fourth of July	Humbug		
Foy	Humbug	Tip-top Co.	85 foot shaft
Gen. Crook			
Gen. Kautz	Big Bug		
George	Humbug		
Georgia	Humbug	C. A. Carpenter	
Golden Crown	Walnut Grove.	W. A. Cullumber.	Old shaft 94 ft
Goodwin	Turkey Creek	M. Masterson et al. (G. M. Co.)	200-ft. shaft; 200-ft. tunnel; air tunnel 73 ft.
Gopher	Big Bug	Gen. Kautz	Shaft 65 ft
Grasshopper	Turkey Creek.	Hayes	
Gray Eagle	Bradshaw Basin.		
Grecian Bend	Tiger	B. T. Biggs	
Grecian Bend, south	Tiger	G. A. Hammond	
Gretna	Pine Grove	Bradshaw Mill & Mining Co.	
Hatz & Collier	Turkey Creek		
Herbert Claim, Am. Ledge.	Turkey Creek		25 ft.
Herbert Ledge	Bradshaw	H. M. Herbert.	
Hidden Treasure	Pine Grove	Kutz, Caller & Sheckles.	15 ft
Hidden Treasure	Humbug		
Highland Chief	Humbug	McPhee & Dermont.	
Holmes' Claim	Turkey Creek		85-ft. tunnel; 20-ft. winze.
Hundred-and-One	Cherry Creek	Bainbridge	
Huron	Humbug		
Idlewild	Bradshaw Basin.	Luke & Co.	

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
2½ m. to Luke's Mill.	$75 est.; $300 to $2000 est.		Gold and silver.
Prospect of mill		$2,000	One foot wide.
			Silver.
5-stamp mill near.			
	$25		Galena ore; 5000 tons worked.
In district	$500		2-ft. vein.
In district			
In district		$1,050	Three miles from Pearl, on Cross-cut lode. Pay-streak 20 inches to 70 ft. in depth; then widened in solid sulphuret ore. Only mine in district that has reached water level.
5-stamp mill near.			
In district			
In district		$400	Estimated on the surface.
Mill 1½ mile		$50 to $100	Lead 2 feet wide.
5-stamp mill	$300	$117 to $1,130	Silver; 30 miles SE. of Prescott; vein 3½ to 6 ft.; pay-streak 26 in.; cl., blk. metal and carb.; discovered in 1863 by Gov. Goodwin.
In district		$50 to $450	
			Gold and silver.
			Adjoining "Tiger."
			Adjoining "Tiger."
1 or 2 miles N. of Luke's mill	$464		Silver; 4-ft. vein.
In district			
In district		$400	3-ft. vein.
			Adjoining "Tiger."
Luke's mill about a mile	$90; arrastras		2-ft. vein.
In district		$750	1st extension of Tip-top SW.
In district			Gold and silver.
In district	$250		Silver; next south of Katz, Collier & Masterson's claim—Goodwin lode.
			Silver.
In district			
	$464		4-ft. vein; silver.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Inca	Humbug		
Index	Bradshaw	J. C. Cahill	
Index South	Bradshaw	Donohue	
Isabella—four claims	Humbug	A. J. McPhee, G. S. Demint, W. Gillespie, J. R. Daroche	Shaft
Jack-on-the-Green	Peck		
Jedo	Hassayampa	G. E. Berry	
Jefferson	Humbug		
Jefferson	Walker	W. C. Jones	
Joy	Near Clifton	W. McCormick, superintend't	
Jumper	Turkey Creek		
Kelly's			
Keystone	Agua Fria	Keys & Gilbert	
King Lear	Hassayampa	G. W. Curtis	
Kit Carson	Big Bug		78-ft. shaft
Laurena	Tiger		
Lehigh Copper Veins	Bet. Prescott & Skull Valley.		
Litigant	Peck		
Little Bonanza	Turkey Creek		
Little Fraud	Peck	Chenowitz & Robbins.	
Little Joker	Turkey Creek	M. Masterson	
Little Rebel	Walnut Grove.	Cullumber & Co Henry & Co.	
Little Spring	Yavapai	Wisdom & Gudgron.	
Longfellow	Clifton	H. Levinsky, Wm. Sutherland.	
Lora	Santa Maria	Evans & J. Sutherland.	
Loreno	Bradshaw Basin.		
Major's		Alex. Majors	
Mammoth	South side of Bradshaw Mt		
Mammoth	Turkey Creek	Wm. Archer	
Maple Gulch (in)	Hassayampa	Kelley & Co.	
Marcus	Weaver		Shafts
Maryland	Lynx Creek		
Masterson	Turkey Creek		
Matilda	Near Clifton		
Mazeppa	Bradshaw Basin	Donahue	
McCurdy	Turkey Creek		
McDerwin	Humbug		
McDougal			

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
In district		$500 to $1,500	
			Silver, free from sulphurets.
		$200	3 feet wide; new.
15 miles southeast of Bradshaw Mill.		Six assays average $1,378	Half mile NW. of Rescue, or 1 N. of Swilling; 25 S. of Alexandra; ledge 2 ft; paystreak 2 inches: improving from 50 ft. down.
In district			New.
			1st ext. S. of the Benjamin.
In district		$26.30 silver; $180.18 gold	Very large ledge; new; assay was at the surface.
			Copper.
In district			
	$80		4-ft. vein; silver.
			Gold and silver.
			Gold and silver; 1st ext. N. of the Adel.
Agua Fria Furnace a few miles.	$100 to $600		2 to 4 ft. vein.
			Ross Browne, '69.
In district			New.
In district			N. and adjoining Goodwin.
In district			New.
In district			Silver.
Arrastras; five-stamp near.	$75 to $100		
			Silver.
	35 per cent		Copper.
			Gold.
	$250 (?)		Pay streak 15 inches.
		$40 to $200	2-ft. vein.
			Ledge 15 ft. for 2½ miles; new.
			Gold and silver.
Arrastras near.			
5-stamp mill			
			Copper.
1½ m. S.E. of mill		$200 to $300	Gold; 8-in streak.
In district			
			Silver; old mine.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Mexican	Globe		
Mesa	Big Bug		
Midnight	Ash Creek	Wallace, Lyons & Stemmer.	
Miner	Turkey Creek		
Minnehaha	Pine Flat		
Monroe Spring Mines	60 m. S. of Prescott.	Jessie Jackson and S. Rood.	
Monte Christo	Peck	Huff	
Morning Glory	Turkey Creek	Scott & Wells	60 feet
Mountain Boy	Bradshaw		
Mountain Queen	Peck		
Multum in Parvo	Weaver	Geo. Bird	
Naiad Queen	Humbug		
Nestor	Peck	J. Moslonski	
Nevada	Humbug		
Nevada	Turkey Creek	E. P. McCurdy	
New Era (now Thurman.)			
Nopal	Bradshaw		
Norton	Hassayampa	Robles & Norton.	
Occident	Peck		
Occidental	Lynx Creek	Elliott, Rice & Co.	
Old Dominion	Peck		
Omega	Humbug		
Oneida	Humbug		
Ontario	Humbug		
Oriental	Hassayampa	A. R. White	
Pearl	Humbug	Tip-top Co.	100 feet
Pearl	Turkey Creek	Vashay & Co.	
Peck	Peck; 30 m. E. of S. from Prescott.	Incorp. Co	800 feet shafts Tunnels, 1200 feet
Peeples	Peck		
Peerless	Turkey Creek	Ward & Co	Three shafts
Pensacola	Hassayampa		
Perry	Hassayampa; 8 m. S. of Prescott.	Layton, Otto & Parks.	Tunnel
Picacho	Chimney Peak		
Pine Flat	W. end of Bradshaw Basin.		
Pine Mountain	Walker Dist.		
Poland	Big Bug		100-foot tunnel
Plug Ugly	Hassayampa		
Pointer Claim	Lynx Creek		
Queen of Beauty	Peck	W. G. Wender, J. R. Doll, C. F. Hubbard.	
Rescue	Humbug	C. A. Carpenter	20 feet

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
	$200		3-foot vein; silver.
	$60 to $200		Gold.
			Gold and silver.
In district			Gold.
Luke's Mill in Basin.			Mentioned by J. Ross Browne in 1869.
In district			Silver.
Arrastras			1¼ miles S. of Goodwin.
			Gold.
In district			New.
Arrastras	$80.		
In district.			
In district			Gold and silver.
In district	$670		On Cottonwood creek.
			Gold and silver.
In district			
8 arrastras			
In district			
In district.			
In district.			
In district			
			Gold and silver.
In prospect	estimates $85 silver, $15 gold.		On Cross-cut lode.
			Gold and silver.
Ten stamps	assorted ores $700; av. $400.	up to $7,600	
		$1000 to $1500	
			New.
		$1300 to $1400	Horn silver, black sulphuret and galena.
5-stamp mill			Gold taken 15 years.
Luke's Mill in Basin.			
			Old mine, 1869.
	$122 to $300		Gold and silver.
			New.
Arrastras			
In district.			Silver.
In district		$1,500	Chloride ore.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Roach Claim	Turkey Creek	Roach	
Robert Abbott	Walnut Grove	J. F. Mahoney, disc.	
Robert Lee	Humbug		
Rodenburg (J.N.)	Humbug	Rodenburg & Miller.	
Salvador	3 m. E. Prescott		
Sampson	Hassayampa	J. H. Kelley	
San Carlos Lode	Humbug		
San Gunars	HassayampaCk	Ruibal	
San Miguel	HassayampaCk	Ruibal & Rodriguez.	
Senator	Hassayampa, 12 m.fm.Prescott		200 ft. shaft; drifts, stopes and tunnels
Sexton	Weaver	Partridge	Several shafts and tunnel.
Shelton	Bradshaw Basin.	Kendall & Co.	20 ft
Signet	Humbug		
Silver Belt	Big Bug, 15 m. SE. of Prescott.		140-ft shaft
Silver Chamber	Humbug		
Silver Crown	Metzal	J.O. Dougherty	
Silver Flake	Big Bug		100-ft shaft
Silver Jacket	Humbug	Carpenter&Satright.	
Silver Joe	Turkey Creek		
Silver Prince	Peck	Houghtalin & Curtin, Myers & Henderson.	100-ft. shaft; seven openings.
Silver Princess	Peck		40 ft
Silver Star	Humbug		
Silver Vault	Humbug	Dav. W. Hume.	
Stand-by	Humbug	Anderson, Bolins et al.	
Storm	Hassayampa	C. Garretson	
Sulphide Lode	10 m. E. of Peck		
Sunrise	Big Bug		
Sunrise	Turkey Creek	E. P. McCurdy.	
Sunset	Big Bug		
Swilling	Humbug	Sold by J. Swilling.	30 feet
Taurus	Humbug	Tip-top Co.	Shaft
Tex	Humbug		
Thompson's	Near Clifton	E. V. Thompson Supt.	
Thunderbolt	Walnut Grove	J. C. Mahoney, disc.	
Thurman (formerly New Era.)	Tiger	Br. M. & M. Co. & Hatz & Collier.	

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
			On Goodwin Lode.
			Gold.
In district			New.
In district			Gold and silver.
Aztlan Mill n'r.	$750		Gold and Silver.
			New.
In district			
			Gold; disc. Sept., 1876.
Furnace	$700 total; $74.40 silver		Silver, copper, and lead.
At the mine; 10-stamp; cost $20,000.		$85 gold	Gold and silver.
Mill at Wickenburg.	Croppings $15 Arrastras, $37		Free gold; 10-foot vein.
Luke's Mill			3 feet good gold ore.
In district			Gold and silver; rich but not wide.
	$300 silver; 20 per ct. lead.		Argentiferous galena.
In district			
			Gold and silver.
	$100 to $600		2 to 4-ft. vein.
In district			
Ore shipped to San Francisco	$250 to $1000.		Lode parallel with Peck, half mile south-east.
In district			A spur of the Silver Prince.
In district			New.
			Gold and silver.
			Gold and silver.
			Silver; new.
Prospective	$513, selected	$100 to $1000.	Ledge 30 inches.
	$85 silver; $15 gold.		Free milling.
In district		$370	
			Copper.
			Gold.
2½ m. fm Luke's Mill.	$30		2½-ft. vein; gold; sulph.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Ticonderoga	Big Bug		
Tiger	Tiger	Leased by H. Helm et al.	S. shaft 100 feet; tunnel, 260 feet.
Tiger, 1st ext. North.	Tiger	W. A. Linn	
Tiger, ext. next S.	Tiger	Hammond & Riggs.	
Tiger ext's 3 to 6 S.	Tiger		
Tiger ext. 7th	Tiger		40 feet.
Tip-Top (North)	Humbug	Incorp. Comp'y	3 tunnels; 5 shafts.
Tip-Top (South)	Humbug		3 tunnels; 2 shafts.
Top-Knot	Peck	D. McMillan	
Twin Brothers	Turkey Creek	J. C. Potts	
Tonawanda	Humbug		
Tonto (South)	Metzal	Joseph Reily	
Trinity	Turkey Creek		50 feet.
Turkey	Big Bug		
Twin Brothers	Turkey Creek		
Vanderbilt	Big Bug	Vanderbilt et al	
Vandyke	Humbug		
William Wallace	Peck	Peck Min'g Co.	
Walsh	Humbug	Norval & Walsh	
War Eagle	Peck	Jackson Bros. & Co.	
War Eagle, No. 2	2 m. N. of last.	Linn, Coe & Co.	
Wild Pigeon	Peck.		
What Cheer.	Walker		
White Pine	Turkey Creek	Ward	
Willow	Humbug	Gavin & Robinson.	
Wingfield	Turkey Creek	H. Ashton.	
Zalida.	Lynx Creek	Noyes, Day, Kelley & Fitch	70 feet.
Zone	Metzal.	Dougherty & Boyd.	

In Pima county the mining districts are at once the oldest and the newest on the Pacific slope, north of Mexico. They are mainly in the Santa Cruz valley, and a region to the west thereof once known as Papagueria, inhabited by the semi-civilized ancestors of the present Papagoes. Traces are not wanting of their having been worked even anterior to the Spanish conquest of Mexico, by a people superior to the Spaniards of that day in nearly all the useful industries, and only excelled by them in the industry of slaying and marauding.

Although there are some indications that mining operations were more or less carried on here by the Jesuits and others, in

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
....	....	....	....
....	$100 to $300	....	Disc. by Moreland years ago.
....	$90	....	....
....	....	....	....
....	....	....	....
....	$50	....	....
5-stamp mill six miles.	$550, selected.	$221 average.	Antimonial and stephanite; ten hands.
....	....	....	....
....	....	....	Gold and silver.
....	....	....	Gold and silver.
....	....	....	....
....	....	....	Gold and silver.
In district	$300	....	Pay streak 3 feet.
....	$60 to $200	....	Gold.
....	....	....	Gold and silver.
....	....	....	....
....	....	....	....
In district	....	$90 up	1¼ NE. Peck Mine
"	....	....	Silver.
Mill 5 miles	$120	....	Gold and silver.
Arrastras	$40–$200	....	Gold and silver.
....	....	....	....
....	....	....	New.
....	....	....	Silver.
Prospective	$440 (?)	....	2-ft. vein.
In district	....	....	Gold and silver.
Aztlan mill	....	$150–$3,000	In porphyry and slate dikes. Silver.
....	....	....	Gold and silver.

the seventeenth century, it is not until 1748 that the records became definite. In that year the San Pedro gold mine, it is known, was worked by the Spaniards, by whom, from 1757 to 1820, mines were worked in the Baboquiveri region, some seventy miles south-west of Tucson, one of them to a depth of nearly 300 feet; as well as in the Santa Rita, Central Colorado, and Oro Blanco mountains. But the continuous attacks of the Apaches, commencing with the year 1780, finally caused the abandonment of nearly all mining enterprises in what is now Pima county, except some placers, which have been worked at intervals by Mexicans and Indians up to the present time, and the mines of Fresnal and Cababi. And it was not until some years after the Gadsden purchase, in 1853, when the military occupation of the country by the United States Government seemed to warrant expectations of security, that mining operations to a large extent, under the auspices of military men, were resumed. Many of these were largely successful, and in scarcely any were the failures traceable to deficiencies in natural richness. But the incursions of the Apaches continued to such an extent that, after a number of superintendents and other employés had been killed by them, the mines were mostly relinquished. Some few years have elapsed, even after their final pacification, before the tide of enterprise again set in to the mines of southern Arizona, now known to have been always prolific, even under unskillful handling, in a degree far surpassing those of California and Nevada, which have created the money kings of the continent. And now, combining the advantages of age and youth, having a level country and generally good roads, with the single drawback of 200 to 300 miles of wagon transportation, soon to be replaced by more than one railroad to navigable water, there is no more promising field to the large or small mining capitalist than the mines, actual and prospective, in the southern and western portions of Pima county.

In the last century, one of the most notable of lost mines of what is now Arizona was that called Planchas de Plata—the "planks of silver." Its exact position is unknown now, though the neighborhood in which it was found is plainly indicated by the old records and letters. Don Manuel Retes, in an essay on the mineral resources of northern Sonora, says: "This mineral deposit, situated 31½ deg. north and in longitude 111½ deg. west of Greenwich, is described by a Yaqui Indian towards the commencement of the last century: Distant from four to five leagues from the mine of Arizona; about fifteen from the town of Tumacacori, the nearest settlement; about twenty-five from the Presidio of Santa Cruz; nearly ninety from Ures, and about 130 from Guaymas. The silver was discovered in sheets of different sizes, from which the name of 'Planchas de Plata' originated. They were found almost on the surface, perfectly pure, and without adhering to any foreign substance, in a flexible state capable of receiving impressions, and only hardening on being exposed to the atmosphere. The region which produces them is an earth of the color of, and very much resembling, ashes, which extends in visible leads more or less wide, and in parts subdivided into veins, over all the hills and mountains adjoining the main deposit. Among the sheets extracted two are worth mentioning, especially one which, on account of its almost fabulous size, (weighing 149 arrobas) it was found necessary to employ the heat of four forges at the same time to reduce it to a smaller bulk. The other weighed twenty-one arrobas, though, according to other accounts, it was much larger. The amount of silver extracted within a very short period was 400 arrobas, or five tons."

Another mine of very rich silver was the Arizona, the position of which is also lost. It was in search of this mine that Count Rousset de Bourbon made his celebrated expedition into Sonora, whither he went at first in good faith and with peaceable intentions, though after he had been defrauded and attacked he turned filibuster. There are persons who are ready to assert that the exact position of the Arizona mine is known, but the best informed say it is not.

In the vicinity of Tucson itself there are not a great number of lodes yet located, as compared with those further south. The ores are similar to those of the Tubac region, though not as rich as the Santa Rita lodes. There are (or were) some copper mines westerly from Tucson; also a silver and lead mine, that has yielded $150 per ton. The Sopori ranch and mines lie nine miles south of Tucson, and a little south of the Papago reservation, with its famous mission church of San Xavier del Bac. There is a considerable amount of timber on this ranch, chiefly mesquite, (which is really a variety of locust) cottonwood, ash, sycamore, and walnut. The extreme eastern portion is mountainous and has a good deal of yellow pine. There is a large area of grazing land, and the valley bottom, (Santa Cruz) though limited in area, is fertile to a high degree. There is an old silver mine on the estate, which was formerly worked. Frederick Brunckow, a well known geologist and mining engineer, reported in 1859 that ore yielded "from ten to fifteen marcs per cargo." Gold has been washed in this vicinity during the rainy season, and is to be found in the Tenajas mountains."

Nine miles from the San Xavier mission and eighteen miles southerly from Tucson are the San Xavier and the Pima mines, which are of some importance. The San Xavier mine is an old lode, long known and partially worked by Mexicans, six miles west of the Santa Cruz river and 500 feet above its level. The ore consists of argentiferous carbonates and sulphates of lead, estimated to yield an average of sixty-five dollars per ton in silver and forty to sixty-five per cent. lead. The belt of limestone in which it is found is 200 feet in width, running north-east and south-west. Furnaces are to be erected, and the mines are sure to prove profitable. Colonel Sykes, the present proprietor of the San Xavier, was formerly well known as a newspaper publisher in New York city. The Pima mine has a principal shaft and several tunnels. A large amount of work has been done. The mine is owned by parties in San Francisco, who seem satisfied with their venture.

Arivaca mining district commences at a stone monument near the buildings of the Arivaca ranch, thence 10 deg. west of south to the Sonora line; again commencing at the monument and running east ten miles, thence north fifteen miles, thence north-west to the intersection of the main road from Tucson to El Plomo, and thence along said road to the Sonora line. Its central point is known as the Van Nostrand Mining Camp, which is claimed to be the most beautiful mining camp in the Territory, its natural advantages having been set off by artistic supervision on the part of Mr. McCafferty, of the Ortiga mine, where black metal has been struck at seven feet said to assay $500 to $10,000 per ton. On April 7th last he and others discovered the McCafferty lode, on which eight other locations have since been made, and five prospected from fifteen to fifty feet deep. The lode trends north and south, dipping to the east; the ore is heavily charged with chloride, and many fine specimens of horn silver have been taken from the Van Nostrand mine, which is on the discovery location. Two miners working on it discovered in May last, in connection with a Mexican, an old mine long searched for by many prospectors, situated between the Cerro Colorado and Las Guijas mountains, said to contain superior ore. It was one of about twenty old silver mines in the Arivaca valley. Among other mines in this district are the Buena Vista, Mogul, Relief, Silver Eagle, Bella Andrieta, and two Black Eagles. The Mogul is a gold mine. Besides Mr. McCafferty, Captain Voisard and Messrs. Buck, Hudson, Burt, Mitchell, and Jones are among the most prominent operators. Frederick Brunckow, mineralogist and engineer, in a report on the minerals in the Arivaca valley, (1859) says: "The veins contain solid tetrahedrite, the German fahlen and lead ore, yielding from eighty to one hundred ounces per ton. The lead mines contain argentiferous silver. The yield of the gold is estimated according to assay, and one ounce of the argentiferous silver is worth $1.50."

The Oro Blanco district is best known because of the Ostrich mine (gold) located therein. It is eighty miles southwest of Tucson, and is found to extend along a distance of more than 6,000 feet. A number of locations have been made. The lode is reported as from six to twelve feet wide. The ore assays from forty to one hundred dollars per ton, and contains besides a large amount of silver. Several shafts are sunk, and a ten-stamp mill has been built. This old mine is claimed to be the old and lost Tumacacori, where the Jesuit operators were totally extinguished by the Apaches. Other mines, however, make the same claim. Skeletons in the works and the very rich ore on the dump indicate that the workmen staid by the mine until killed by Indians.

The Oro Blanco district reaches to the Sonora line, just across which Messrs. O'Meara and Miller are said to have discovered galena ore averaging $100 to $300 per ton in silver. Wood and water are plenty. The country on both sides of the line from Sassibi to the Santa Cruz is doubtless rich in valuable minerals. The ruins of old arrastras and smelting works show that many mines were worked there "in ye olden time." South of Ostrich mill and towards the line more than sixty claims have been recorded. Messrs. Kirkpatrick and Flood, of the Warsaw claim, have made twenty-three openings thereon, and twenty-two assays show the average value of the ore to be $160. Another vein parallel with the Warsaw is 4 ft. 8 in. in width; and numerous assays indicate $309.57 per ton as its value. From these and other mines owned by the same company 100 tons per day can now be taken out, that will average $100. The whole mountain range from Sonora to Tubac is claimed to be full of valuable veins, but little prospected as yet.

This completes the enumeration of mines and mining districts from Tucson to the Mexican line, in the Sierras forming the western line of the Santa Cruz valley. A few mines are in the region adjoining these districts, which region consists for about eighty miles west of Tucson of grassy and sometimes flowery plains, diversified by low and mainly unwooded mountain ranges, in the eastern portions of which springs are not very common; while in the plains, though streams appear to be unknown, water can probably be obtained at an average of from twenty to forty feet. Deer and antelope here find a liberal subsistence. This once populous but now almost uninhabited region is separated by a large tract of desert and the

Gila river from the inhabited portions of Yuma and Maricopa counties. About thirty-five miles south-westerly from Tucson, across these grassy plains, and skirted by mountains, is the Montezuma mine. The lead trends north-west and south-east, dipping south-west seventy-five to eighty degrees. The country rock is trap; the neighboring mountains are granite. The vein of crystalline, friable quartz is five feet in width, heavily charged with metalliferous minerals, one of which, black and crumbling, resembles the black silver ore of the Comstock; there are also the sulphuret, blue and green carbonates and red oxyd of copper, and a very little lead. The ore is said to be almost identical with that of the once famous Cababi mine, in the same region, some seventy miles west by south of Tucson. It assays $800 to the ton. The mine is quite accessible; water is found at a short distance; timber is scarce in the immediate neighborhood; four men are working on it.

The Pima district is on record as commencing two miles north of Cradle rock, thence south ten miles, thence west ten miles, thence east eight miles to the place of beginning. It is about thirty miles south-west of Tucson; but nothing definite is known to the writer as to its mining development. The Nequilla mine is twelve miles west of Tucson, in the Amoda mountains; it was discovered in 1865; the vein courses north-east and south-west; it is mostly amalgamating ore.

In the Baboquivari range are a number of locations once worked and now being again prospected and taken up for working. The Fresnal lodes, near the Mexican-Papago hamlet of that name, are the best known. The country is very rough and broken; timber, wood, and water are in general scarce. The ores are sulphurets of silver, argentiferous galena, black and brownish ores. The Prieta is the chief lode, with bold croppings, which has been traced for several miles. It has been reduced by the patio process, and found to give from thirty to forty-five dollars per ton. The Colorado vein in this district has recently been resumed. Ore therefrom has yielded $100 per ton. These lodes are sixty miles west of Tubac; and like the Cababi, Sierritte, Ajo, and Santa Rosa lodes and mines, are all in the Papago country—Papagueria, as it was formerly called—which is now abandoned by these Indians, who are concentrated either on the San Xavier reservation or nearer to and south of the Pimas. The Cababi district is in the mountains of that name, and contains ores of sulphurets (amalgamating) and moderately rich in character. One mine, the Picacho mine, has been worked for many years. The average yield is about eighty dollars per ton. Another mine, the Cobriza, has yielded on selected ore an average of $550 per ton in silver and copper. Professor Pumpelly described these veins as being "in a quartziferous porphyry and in an amygdaloid rock. * * A great number of veins of quartz and barytes occur in these two formations. * * Several specimens of heavy spar associated with silver glance from various localities were shown" to him. There is sufficient water for mining purposes, and when the Picacho mine was worked pumps were needed. Mexicans and Indians have always been and still are in the habit of working over this region. At Quijota, west of Cababi, dry placers have long been worked by the Papagoes and Mexicans. The gold is coarse, and large pieces have been found. There are other dry placers, without doubt. Very few whites have ever traversed this region. Professor Pumpelly, Hon. C. D. Poston, Herman Ehrenberg, Colonel John D. Graham, and a half dozen others who were or are known, have been the only or rather chief explorers since the Gadsden purchase was consummated. Labor is cheap, and Sonora offers supplies at moderate prices. There is no doubt but, forbidding as this region is, that it will ere long be the center and scene of great mining activity. The Ajo copper mines, sometimes termed the Arizona mines, have quite a history. They are about forty miles south of the Gila, about one hundred miles from Yuma, and sixty miles north-west of the Cababi district. These mines were worked by American capital for some years, soon after the occupation of the region. They were long famous to Mexican tradition and history. The ores are said to be among the richest of red oxyd, malachite, and gray sulphurets of copper ever worked. Formerly they were carried to Fort Yuma, and thence transported to San Francisco, or shipped by sea to Swansea, Wales, and Boston. The lack of water on the desert road to Yuma caused the suspension of work. This can be remedied only by the construction of tanks. There are copper lodes also at Santa Rosa, fifty miles directly west of Tucson, on the road south from Maricopa Wells. There is a large area of volcanic remains, some of which, geologically speaking, are of a recent date.

J. Ross Browne, in his "Adventures in the Apache Country," described with his usual graphic humor a visit to this remarkable region. It is worthy of quotation, as it illustrates a process which has greatly hindered the settlement of southern Arizona.

"A day's journey through the portion of the Papagueria lying along the foot-hills of the Baboquivari brought us to the first of the inhabited rancherias, near which is the small Mexican town of Fresnal, a collection of adobe hovels built at this point within the past two years, on account of the convenience afforded by the Indian wells for the reduction of ores stolen from the Cahuabia mines. There are also some rich silver-bearing veins in the neighborhood, but they have not been developed to any considerable extent.

"A curious feature in Arizona mining operations that frequently attracted my attention was here exemplified. The Cahuabia district is situated in a detached range of mountains, distant about twenty-five miles from Fresnal, and although a limited quantity of water exists there, which could be increased by a small amount of labor, the Mexicans steal the ore from abandoned or neglected mines, and pack it across the intervening desert sooner than go to the trouble of digging wells for themselves and reducing the silver on the spot. There is no advantage in the way of wood and other supplies at Fresnal which could not be had by a little trouble at the Cahuabia.

"I asked the padrone, whom we found at work driving a blind horse around one of his arrastras, why he went to the trouble of making trips to the Cahuabia mines and packing the ore twenty-five miles to reduce it, when he could do it as well on the spot. His reply was, '*Quien sabe?*' I suggested to him that, from all I heard, water was as plenty in the ground there as it was here, and wood still more so. To this he answered: 'Si, Señor—*quien sabe*—quisas si—quisas no—*yo no sai*.' I ventured to hint that if the owners of the ore chose to prevent him from stealing it they could do so as well at Fresnal as they could at Cahuabia. 'Si, Señor,' said the padrone, '*yo pienso co si—yo no sai—quisas si, quisas no—quien sabe. Yo son muy pauvera.*'"

To return to the valley of the Santa Cruz. The famous Cerro Colorado mines and district will be found situated on the side of the mountain of that name; it has long been conspicuous in the history of this portion of the territory, on account of the Heintzelman mine. The district lies twenty-two miles west of Tubac, and eight miles north of Arivaca. The ore is silver copper-glance, running an average of six per cent. silver. The gray copper ore (argentiferous) which accompanies it runs two per cent. silver. The yield was estimated when worked formerly at an average of $120 per ton. Herman Ehrenberg, a well known engineer, stated the yield in

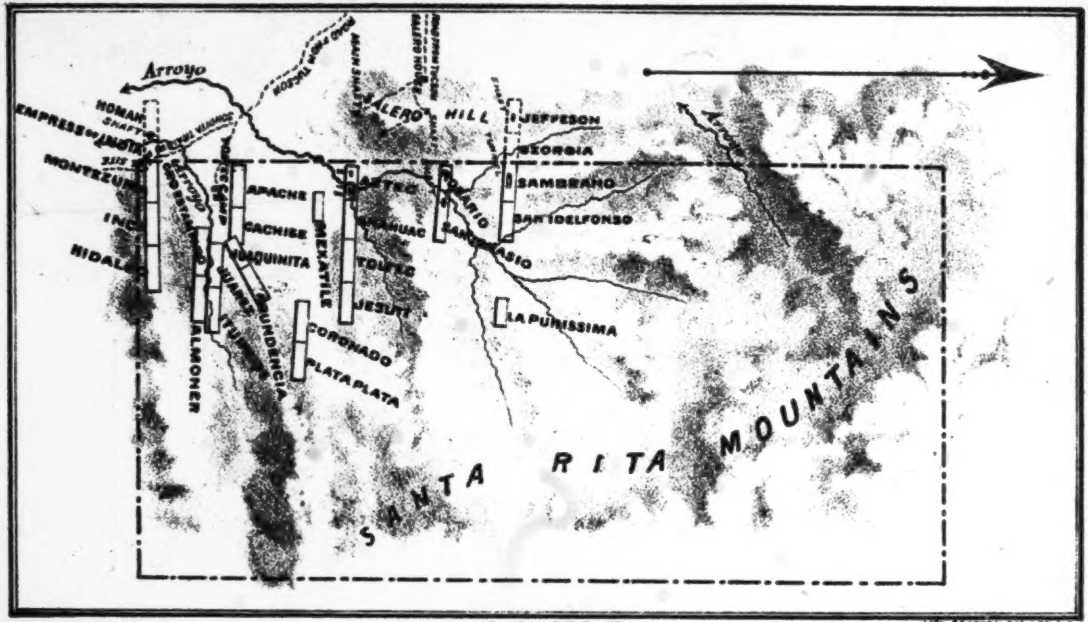
1859 at about $549 per ton. General Heintzelman in a letter the following year placed the yield as high as $920 per ton. The ranch on which this mine and other mines are situated, was famous even in the days of the Jesuit mission. It comprises 17,000 acres, has much of fine meadow and pasture land, is capable of sustaining large herds as well as raising good crops, with moderate irrigation facilities, deep plowing and other adjuncts of good farming. The lower end of the valley has an abundance of cotton-wood, and there is a great deal of dwarf live-oak and mesquite timber. The valley of the Santa Cruz, with the important districts embraced in the Santa Rita system, are both described elsewhere in the chapter devoted to the Santa Rita mountains.

The Arivaipa district, recently changed to the De Freese district, is at the head of a lateral cañon some four miles to the north of the head of the Arivaipa cañon, and about seventy miles north-east of Tucson by air line, but at least 120 by the route usually travelled. Forty-four distinct mineral leads have been located, of silver, copper and lead, with a trace of gold, and in one case a promise of tin. The veins are in the Turnbull mountains, the main chain of which is granite; some of the outlying spurs and foot hills have strata of limestone and slate. Pine timber, cold springs, and a view of the country for 100 miles each way are found at the top of Mt. Graham, 10,375 feet above the sea. A good wagon road has recently been opened from Cottonwood camp, on the Arivaipa, to the mines, seven miles, so that there is now a good road from Tucson to the mines. Grass and water are abundant.

The San Pedro lodes to the south-east of Tucson, in the valley of the Rio San Pedro, are now being prospected extensively. The valley is important for its agricultural and grazing lands. In the southern branches, known as the Rio Babacomori, and near old Camp Wallen, two or three rich locations have been made on the Babacomori ranch, one of the few unquestioned Spanish grants in Arizona. Mr. Pumpelly described the San Pedro lodes as showing massive copper glance and ores in tetrahedite. There are dry placers at the Cañon d'Oro, on the Tucson road, which have been worked for years, and generally at a profit. There is evidence of far distant workings also to be seen. A mine was discovered and worked near Camp Bowie several years ago by Col. Stone, afterwards killed by Apaches. This is in the extreme eastern portion of the county. In and near the Dragoon, Chiricahui, and adjacent mountain ranges valuable mines will probably be developed; but that region is not now available, having been an Indian reserve, until formally restored to the public domain.

The Patagonia mountains on the Sonora line, and directly south of the Santa Rita range, are chiefly noted because of the Mowry mines, owned formerly by Lieutenant Mowry, U.S.A., now deceased. A large amount of money has been expended on them, and their value has been greatly talked about. Later investigations establish that they are not as rich as reported. J. Ross Browne said, in 1864, he "found that the average of ores ranged from thirty-five to forty dollars per ton. The lode averages about four feet in thickness." The country is well watered and timbered, and the landscapes are both romantic and striking. This property is ten miles from the Mexican line, twenty miles from old Fort Wallen, fourteen from the Mexican town of Santa Cruz, and 280 from Guaymas. There is a good highway to that port. The Mowry mines are 6,160 feet above sea level. The Patagonia mountains form the most northerly hills of the Sierra de Santa Cruz, and the Mowry mine lies on the eastern slopes thereof. On the north-east are extensive plains with mesquite and dwarf oak, and well covered with succulent grasses. The road from Camp Wallen crosses a low range of hills jutting from the eastern slopes of the Santa Rita range, which are covered with oak, pine, sycamore, hazelnut, mesquite and poplar. There is an abundance of game in this whole region. There are small veins of rich ore in the Mowry. The galena of the principal vein contains a small percentage of copper and arsenic. The engineers who have reported on this mine all declared that the methods employed were too costly. There are other locations in the neighborhood. The Olive lode, half a mile to the west, has three shafts sunk on it. The San Antonio, Empire, and La Esperanza mines have all been sufficiently worked to prove that there is argentiferous galena in quantities sufficient to pay for working. The Gualota lode, four miles west, is an old location in which a vein of ore three feet wide has been found, showing sulphurets of silver, with some traces of gold. The old Trench mine in these mountains has been leased to a Mexican—Señor Padres. The main shaft is 240 feet deep, and the vein is six feet wide. It has been worked by Mexicans in the "long ago," and probably by Jesuits in the last century.

The Tyndall mining district, as organized November 17, 1876, commences at the highest Santa Rita peak, thence west 12 miles, thence south 20 miles, thence east 20 miles, thence north 20 miles, to place of beginning. There are about thirty mines already


Arroyo
Arroyo
Arroyo
ROAD FROM TUCSON
ROAD FROM TUCSON
MAIN SHAFT
SALERO HOUSE
SALERO HILL
HONAN SHAFT
EMPRESS OF INDIA
MONTEZUMA
INCA
HIDALGO
ORO ESTAMPADO
ALMONER
APACHE
CACHISE
JOAQUINITA
JUAREZ
ITURBIDE
PRUDENCIA
MEXATILE
AZTEC
ANAHUAC
TOLTEC
JESUIT
CORONADO
PLATA PLATA
ROSARIO
SANTA ASIO
JEFFERSON
GEORGIA
SAMBRANO
SAN IDELFONSO
LA PURISSIMA
SHAFT
SANTA RITA MOUNTAINS

PLAN OF THE

AZTEC MINING DISTRICT

PIMA COUNTY, ARIZONA.

located with very promising prospects. The mill of the Tyndall Mining Company will be located on the Sonoita river about nine miles distant. This district and that of the Aztec Syndicate, identified as they are with the most prominent historical facts, are described in the chapter on the Santa Cruz valley.

The Aztec district joins the Tyndall to the east, and is on the western portion of the Santa Rita mountains. Wood and water are abundant in the immediate vicinity, and the adjacent valley of the Santa Cruz furnishes a liberal supply for nearly all gastronomic requirements of man or beast. In this and on the eastern slope of the same range are a number of old mines formerly worked by the Spaniards. Old Mexican traditions place their average yield at from $340 to $680 per ton; and the assays so far confirm the correctness of these records. The Josephine and Emma mines are based upon an old shaft, then nearly full of sand and water, discovered by Mr. Roddick and James Britton, in the inauspicious month of April, though there is no "fooling" about assays that average $900 at a depth of thirty-two feet. Four men are now employed at these mines under Mr. Roddick. There are a number of other locations in these districts, but very little work has been done as yet thereon. On the east side of the Santa Rita, not far from Camp Crittenden, a number of claims have been located and are being worked. The cañon contains good placer ground also. On the east of the cañon the veins are gold, on the west side they are silver. Among the claims above mentioned is the Alta, which was developed entirely by the owners' labor, and thus kept free from debt. By lixiviation seventy-five per cent. of the assay value of the ores, which is over $100 per ton, is secured. The Mariposa silver and gold mine in these placers has vein matter five feet in width at a depth of thirty-five feet, and the pay-streak so soft as to be easily mined with a pick. These placers yield large returns, and one nugget recently found was worth $90.50. But the mineral wealth of Pima county is not confined to metals. At Arivaipa cañon what is believed to be a large body of anthracite coal has been recently discovered, located, and partially developed. Should the expectations thereon based prove to be well-founded, the industry of thousands will be required in connection with its mining and use. As another aid to smelting works, there have been discovered at the Cerro Colorado and in Arivaca valley deposits of metamorphic sand-stone, containing quartz crystals cemented by pure clay suitable for lining furnaces. Up to October 1st, 1876, 975 mines were recorded in Pima county, and this number is rapidly increasing; but the names of only 136 can be obtained for the following table:

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Abercorn	Tyndall	T. M. Co.	
Abundancia	Aztec	AztecSyndicate	Old Shaft
Ajax (see Prieta).			
Ajo (or Arizona)	Lon. 113°, lat. 32° 20′.		
Alaska	Oro Blanco	Kirkpatrick & Flood.	80-ft. shaft
Alaska Ext	Oro Blanco	Armstrong & Jenks.	
Allen	SantaRitaVal'y		
Almoner	Aztec	Incorp. Co	
Alta	French		
Anahuac	Aztec		
Apache			
Argenta	Chiricacui Mountains.	Palmer&Elliott	
Arizona (see Ajo)			
Arizona	Arivaipa		
Aztec	Aztec	AztecSyndicate	2 shafts, 70 and 40 ft deep; drifts.
Bahia	Cababi Mtns		
Bell	Santa RitaVal'y		
Bell Andrieta	Arivaca	McCafferty et al	
Belmont	Cerro Colorado	Vazura M. & M. Co.	
Bertha & Louisa	Tyndall	Roddick & Mercer.	
Black Eagle No. 1	Arivaca	Mitchell&Jones	
Black Eagle No. 2	Arivaca	Mitchell&Jones	
Blake	Tyndall		
Bonanza	Cerro Colorado	Vazura M. & M. Co.	
Boston	50 m. W of Tucson.	Brown, Pearce & Co.	
Broghill	Tyndall	English Co.	
Bronko		DeLong & Jefferds.	
Brown	50 m. W of Tucson.	Brown, Pearce & Co.	
Buena Ventura	Santa Rita Mtns		
Buena Vista	Arivaca	Voisard	3 shafts; tunnel.

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
	$160 to $300.		This is one of a number of old mines, very rich, worked by the Jesuits, and 20 years since by an American company.
		Croppings fm $25 to $100.	
			Copper.
		$461 49.	6-ft. vein; easy access.
		Croppings $75	
		$300 to $800.	Silver ; 75-ft. shaft.
			Similar to Aztec.
In process of construction on the Sonoita.	From $100 to $700.	From $30 as high as $1,000.	This is one of the most promising lodes in Arizona; runs for several miles many feet wide; color everywhere; chlorides and sulphides; easy-milling ores; on the same lode as the old Salero mines.
			1 m. N. of Salero lode.
			Cut.
		60 to 85 p. c. copper, 13 to 16 silver.	
			Two miles from Salero House
		60 to 85 p. c. copper.	
	$350		1½ m. W of Salero.
			Silver.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Cahabi	Papagueria region.		
Captive	Cerro Colorado.	Vazura Con Mining Co.	
Cerro Colorado	Cerro Colorado.	Ownership contested.	Shafts 140, 45, 40 feet deep.
Cobriza	Cabibi Mountains.		
Cochise	Tyndall		
Cokespa	Cabibi Mountains.		
Colorado	Baboquivari Mountains		
Crystal	Tyndall	English Com	
Dora	Tyndall	L. L. Mescio	
Draughtsman	Cerro Colorado	Vazura M. & M. Co.	Cuts
Eagle	Patagonia Mountains.		
Emma	Aztec	Buck, Roddick, Britton and Jacobs.	Shaft and cut
Empire	Patagonia Mountains.		
Empress of India	Tyndall		
Enterprise			
Esperanza	Cerro Colorado	Vazura M. & M. Co.	
Esperanza, East	Cerro Colorado	Vazura M. & M. Co.	
Florence			
French	Patagonia Mountains	Padres, lessees	
Fresnal Lodes	Baboquivari Range.		
Froivita	Santa Rita Mountains.		
Gedge	Santa Rita		
Georgia	Tyndall	AztecSyndicate	
Gibbons	Santa Rita		
Grossett	Santa Rita		
Gualota	Patagonia Mtns		

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
			Long worked by Papagoes and Mexicans — Lode reported rich.
	$82 to $160		Up to 1864, when the works were left idle, there had been taken from these shafts, in silver, $3,990,456.40, or less than $82 per ton. The cost of work for the 48,743 tons, was $2,222,201.
	$550		Selected ore, silver and copper.
	$100		
	$100 to $200		Old Shaft. Total number of shafts in the district is 11, with a total depth of 375 feet.
			Arg. galena. J. Ross Browne.
		$900	Sea Serpent lode, 10-40 feet wide; southwest slope of Santa Rita Mountains.
			Argentiferous galena.
			Santa Rita Mountains; vein 100 feet wide.
			Argentiferous galena.
			2 shafts and cut.
			Shaft and cut.
			Sulphurets, silver, and argentiferous galena.
			Vein 3 ft. wide; sulph. silver; traces gold. J. R. B. 1869.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Hamilton	Tyndall	English Co.	
Heintzelman	Cerro Colorado (same mine.)		
Hidalgo	Aztec	AztecSyndicate	
Home Ticket	Cerro Colorado.	Vazura M. & M. Co.	Cut
Idaho	Oro Blanco		
Imperial	Arivaca	Atkinson & Hooker.	
Inca	Aztec	Incorp. Co.	50-ft. shaft
Iturbide	Aztec	Incorp. Co.	Shaft and tunnel
Jefferson		AztecSyndicate	2 shafts; tunnel
Jesuit	Aztec	AztecSyndicate	
Joaquinata	Aztec	AztecSyndicate	
Josephine	Aztec	AztecSyndicate	
Juarez	Aztec	AztecSyndicate	
Khedive	Tyndall	Thos. Roddick & Co.	Shaft
Lafayette	50 m. W. Tucson		
La Purissima	Aztec	AztecSyndicate	
Lee's Mine	12 m. W. Tucson		
Letitia	Tyndall	Mercer, Roddick & Co.	
Little Placer	Smith's Dist.		
Lost Mine	Aztec	AztecSyndicate	
Louise	Oro Blanco	Holden & Hewitt.	
Magnolia	Tyndall		
Mariposa	Santa Rita Mts.		Shaft
Mary Ann	Oro Blanco		
McDonald			
Merrimac	Tyndall	Kimberly, Boack & Co.	
Mina Blanca			
Mina del Tajo	Cerro Colorado	Vazura Con. M. & M. Co.	Trench
Mogul	Arivaca	Voisard	Shaft
Mohawk		F. McKane	
Montana			
Montezuma	West of Tucson	Hughes, Goodwin et al.	

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
....	....	From 650 oz. to 36 oz. per ton.	400 yds. N. of Blake Mine; two old shafts half filled with water; rich fahl and galena; argentiferous; believed to be the famous Jesuit Mine, Tumacacori.
....	$120	....	Copper and silver; 8 m. N. of Arivaca. See description of Cerro Colorado.
....	....	....	Low grade ore; croppings rich.
....	....	....	....
....	....	$100-$300 silver.	Much of the ore is 72 per cent. lead; ledge, 14 ft. thick.
....	....	....	....
....	....	$300 to $900 ..	On theEmpress of India Lode.
....	....	....	Lode large; ores rich; assays of croppings high.
....	....	....	....
....	....	....	....
....	....	....	....
....	....	$900	SW. slope of Santa Rita Mts. 8 miles from Tubac.
....	....	....	....
....	....	$3,100	Ledge 2 feet.
....	....	60 to 85 p. c. copper.	....
....	....	....	....
....	$150	....	Silver, sulphuret, and galena; J.Ross Browne.
....	....	....	4-ft. vein.
....	....	....	Santa Rita Mountains.
....	....	....	Lode large; croppings rich; old workings traced.
....	....	....	Adjoins Warsaw Mine.
....	....	....	....
....	....	....	Vein 5 feet wide at 35 feet; silver and gold.
....	....	$200 silver...	Much lead.
....	....	....	....
....	....	....	....
....	....	....	....
....	....	....	....
....	....	....	....
....	....	....	Mule mountains.
....	....	$50-$100 silver	Galena; 30 feet wide.
....	....	$800........	Ledge 200 feet wide.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Monumental	Cerro Colorado	Vazura M. & M. Co.	
Moreno		Incorporated Co	
Mowry	Patagonia Mts.	Fish & Bennett	Shafts, tunnels, and drifts.
Nequilla	12 m. W. of Tucson.	Incorporated	120-ft. shaft; two tunnels.
No Name	50 m. W. of Tucson.	Brown, Pearce & Co.	
North Carolina Ledge	Oro Blanco		
North Star	Tyndall	Mercer, Roddick & Co.	
Olive			3 shafts
Ophelia	Tyndall	Mercer, Roddick & Co.	
Oro Estampaelo	Aztec	Syndicate	
Ortiga	Arivaca	McCafferty et al., Buck & Holden.	
Ostrich	Oro Blanco	J. C. Handy & Co.	3 shafts; 2 drifts
Picacho	Cabibi Mtns	L. J. F. Jaeger.	
Pima	12 m. S. of Tucson.	A S. F. Comp'y	two shafts; tunnels 120 ft.
Pinto	Tyndall	Cooler & Jones	
Plata Plata	Aztec	AztecSyndicate	
Poor	Cerro Colorado	Vazura M. & M. Co.	Shaft
Prieta Lode	Baboquivari Mountains		
Providencia	Cabibi Mtns		
Quijota	Quijota		
Recorder	Cerro Colorado	Vazura M. & M. Co.	Cut
Relief	Arivaca	McCafferty et al	
Robley	Aztec		
Rosaria	Tyndall		
Rusk			
Salero	Tyndall	English Comp'y	Two old shafts
San Antonio	Patagonia Mts.		
San Francisco	Arivaca		Shaft 100 ft.
San Ignacio	Aztec	Syndicate	
San Ildefonso	Aztec	Syndicate	
San José	Santa Rita Mts.		

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
....	....	....	....
....	....	....	....
....	$60 to $400 silver, 30 to 60 p. c. lead.	....	Argentiferous and carbonate; discovered by Mexicans in 1857; about 6,000 feet; extensive works; abandoned during civil war; recently resumed.
....	....	$90	Lode 1 to 6 ft. wide.
....	....	....	60 to 85 per cent. copper.
....	....	....	Recently located between Yellow Jacket & Old Mine.
....	....	....	Large vein, and assays well.
....	....	$50-$100	½ m. W. of Mowry. J. Ross Browne.
....	....	....	....
....	....	....	....
....	$500 to $10,000 (?)	....	....
10-stamp mill..	$40 to $100 gold.	....	3 to 12 ft. vein; gold and silver; 50 men employed.
....	....	$80	2 to 6 ft. vein; sil. Disc. in 1860.
....	....	$100 and upward.	But little has been recently made public on this mine; the owners appear to be well satisfied.
....	....	....	....
....	....	....	....
....	....	....	....
Patio process..	....	$30-$45	J. Ross Browne, 1869.
....	....	....	J. Ross Browne, 1869.
....	....	....	Dry placers; coarse gold.
....	....	....	....
....	....	....	....
....	....	....	....
....	....	....	....
....	....	....	....
....	....	$197 and up..	Very valuable lode; water in shaft; 2 miles from Tumacacori.
....	....	....	Argentiferous galena; 6 miles SW. Mowry; discov. in 1862.
....	....	....	....
....	....	....	....
....	....	....	....
....	....	....	....

NAME OF MINE.	District or Placer.	Owned or Leased by.	Work done on Shafts, etc.
Santa Maria	Santa Rita Mts.		
Santa Rosa	50 m. W. Tucson		
Santiago de Cuba		Goodwin & Co.	
San Xavier	18 m. S. Tucson.	Col. C. P. Sykes	
Sea Serpent (lode)	65m.SW.Tucson		
Sedgewick	Santa Rita Mts.		
Serena			
Sierriti	Papagueria		
Silver Eagle	Arivaca	McCafferty et al	
Silver Star	Tyndall.	Mercer, Roddick & Co.	
Sombrero	Aztec	Syndicate	
Sonora	Oro Blanco		
Spangler	Near Tucson		
Surveyor	Cerro Colorado	Vazura Co.	
Tajo	Cabibi Mts		
Tiger	Cabibi Mts		
Toltec	Aztec	Syndicate	
Trench	Patagonia Mts.	Archibald, Gardiner & Hopkins.	Several shafts; two tunnels.
Tubac	Tyndall.		
Tumacacori	Tyndall.		
Twenty-six	Cerro Colorado	Vazura Co.	Shaft and 2 tunnels
Van Nostrand	Arivaca	McCafferty et al	Shaft 50 feet
Vazura (La.)	Cerro Colorado	Vazura Co.	3 shafts and cut
Victoria Lode	16 m. S W. Tucson.		
Warsaw	Oro Blanco	Kilpatrick & Flood.	40 ft. shaft
Wyoming	Oro Blanco		
Yellow Jacket	Oro Blanco	Armstrong, Manager.	2 shafts, 100 and 40 ft.; several tunnels
Young America	45 m. W Tucson	Brown, Pearce & Co.	

In Pinal and Maricopa counties, until within the last two or three years, except in some isolated locations hereafter specified, the business of mining may be said to have been almost unknown. Where the ore in sight now runs up into tens of millions, the Apaches within five or six years of the present time held almost undisputed possession. Camp Pinal and a "Picket Post" thereto attached, (the latter recently developed into a village) were established to check their ravages; they are now in the heart of mining districts scarcely equaled out of Arizona for richness of product. Between the

Mills at or Near.	Product per Ton.	Assays per Ton.	Remarks.
...	...	...	...
...	...	...	Copper; Ross Browne, 1869.
...	...	...	...
Furnaces 6 m..	$65 sil. 40-65 p. c. l'd, est	$40-$180	...
...	...	$50-$800	...
...	...	...	...
...	...	...	...
...	...	...	...
...	...	...	...
...	...	$200..........	Large vein; heavy in chlorides.
...	...	...	...
OstrichMill,6m.	...	...	20 men mine 12 tons per day.
...	...	...	Copper.
...	...	...	...
...	...	...	Named by Ross Browne in '69
...	...	...	Named by Ross Browne in '69
...	...	...	Outcrop, etc., similar to Aztec and Anahuac.
4 furnaces.	$30 to $100 silver, 30 to 80 p. c. lead.	$600..........	4 to 10 ft. vein; argentiferous galena; 50 men employed; old Mexican mine.
...	...	...	...
...	...	...	...
...	...	$100-$4,000...	...
...	...	$1000(?).....	Chloride; horn silver.
...	...	$100-$500,....	7 miles from Arivaca.
...	40-75 p. c.....	...	10 feet wide; copper; Ross Browne, 1869.
...	...	$159.57, average of 22 assays.	2 miles from Mexican line; ledge 8 feet wide.
...	...	$300 to $1200	...
...	$15-$25	...	Free gold.
...	...	60 to 85 p. c.	Copper mine.

Gila and Salt rivers, intersected by the 111th parallel of longitude, lie the mining districts of Globe and Pioneer, with the famous mines therein of Stonewall Jackson, Globe, Wheatfield, Miami, and others. There are also the Pine Grove or Randolph and other districts, which are in general well supplied with wood and water from the Pinal, Apache, and Superstition ranges of mountains, on which they are located. Though the original discoveries were made in Pinal county, the Globe and Pioneer districts soon overlapped into Maricopa, the metallic lodes being distributed with inconvenient disregard of county lines and the corresponding facilities of classification, though perhaps others might put it that the county lines were arranged with a singular disregard of geometric system, natural boundaries, compact form, or other rational bases of demarcation. Being unable to change either lines or lodes, the next best thing to be done is to re-consolidate the counties, *pro tem.*, so far as pertains to outlining their mineral resources. Pinal county was, by legislative act approved February 1st, 1875, constituted from parts of Pima, Maricopa, and Yavapai counties; and not long afterwards the Silver King mine was discovered, as is stated, by four farmers living near Florence, named Reagan, Copeland, Mason, and Long, who were bringing copper ore from the Globe mine, which they had previously discovered. One account attributes the find to the straying of a pack mule which was found upon the croppings; but another sets forth that the same parties discovered it from information given them by a discharged soldier. Perhaps the latter legend may have been substituted for the former to dispense with the indignity of owning a bonanza to so near a relative of a jackass! If facts become so uncertain in less than three years, how can one expect them to keep for ten centuries or more? But however found, it is certain that the Silver King mine *was* found somehow; and its subsequent recorded history is painfully plethoric to those not financially interested. It may suffice to state that it lies near a basin at the foot of steep mountains on a little hill, in a belt of brown and gray speich, cutting

through a country of granite; the vein matter is quartz; the mineral chiefly consists of chlorides and black sulphurets; and much silver nearly pure in character is found in little black nuggets in the quartz. The ores are both milling and smelting. A battery and concentrator has been erected at Picket Post, (twenty-five miles from Florence by tri-weekly stage and four miles from the mine) for convenience of wood and water. Soon after its discovery Copeland and Long sold out to the other two partners for $80,000, which was made from the net profits in less than six months, and Mason sold his interest to Colonel James M. Barney, of Yuma, for $300,000. Their first class ore assays $8,000 to $20,000 per ton; second class, $1,000 to $7,000. It is the first mining location placed on the records of Pinal county. The extensions north and south, owned by San Francisco companies, show the same kind of ore as the original, as also do those along the same ledge southwardly of the Democrat, Red Cross, Cedar Hill, and Athens. The Silver Queen and Belladonna, in the (originally) same district, produce silver and copper, and the ore is of a beautiful color, large pieces being taken out covered with malachite, silver and copper, which sparkle in the sun brighter than emeralds. After passing the Belladonna, the ledge is broken by a cañon, across which it is changed in character, increasing in richness of silver. At the Arko mine a ledge crops out ten to twenty-five feet in height, and ore taken from the croppings has been known to assay $800. Following the ledge south-eastward are in succession the Crown Point, Belcher, Saddle Rock, Grand Turk, Good Enough, Flagstaff, Eureka, Silver Belle, Savage, and Southern Belle mines, and three miles further the Bowman. Assays from the free milling ore of the Crown Point and Belcher—carbonates and chlorides with a small trace of copper—give $1,126; from the Eureka $300 to $1,000; from the Silver Belle $300 to $3,000, the latter being expected to average in product over $400; this ore is also free milling. In the vicinity of the Arko mine another ledge crosses it called the Promo, rich in croppings, mostly carbonates. From the work on the Silver King and the Silver Belle, it is confidently believed that the mines in the Pioneer district,* are true fissure veins and not merely pockets. Across the cañon from Silver King camp (a village of thirty houses, stores and post office) north-west are several other mines in course of development, the ores of which assay from $100 to $500 per ton; among these are the Essex, Nabob, Bilk, East and West Union, Surprise, Last Chance and Peach Orchard. The same mineral belt continnes north-westerly towards Superstition mountains, where in February, 1877, an old Arizonian named Garrett discovered a ledge averaging forty feet in width, probably the largest found in this part of Arizona, and plainly traceable for three miles, which he named the "Randolph." The district is called by this name, and also by that of "Pine Grove," from its proximity (six miles) to large supplies of that timber; it is not likely to suffer for want of names, being also designated the "Reynolds." The district is about ten miles north-west of the Silver King, thirty miles north of Florence, and about the same distance east of Phœnix, from which there is a good road to within two miles of the mines. Shortly after the discovery of the Randolph, on which there were recently thirteen locations, another ledge was discovered on the other side of the ridge, which was called the "Sky-blue" from the color of the ore; and a third in the vicinity was called the "Silver Chief." The ore of all these ledges is high grade and in great quantity. The Randolph crops out in some places twenty-five to forty feet in height, and all the croppings show mineral. The ore is perfectly free milling, mostly chlorides and carbonates of silver. Assays are from $100 to $2,000 per ton, and it is claimed average $500. Next north from the discovery claim is the "Kentuck," followed by the "Manhattan" and "Knickerbocker." Several assays from the Sky-blue and the adjoining Hidden Treasure average $460. The Guanajuato assays $3,000; the ledge is 200 feet in width, and the estimated monthly yield seventy-five tons of ore per month, at $2,000 per ton! Mr. Kearsing, the assayer of Pioneer district, made several assays from the Randolph district which ranged from $300 to $34 per ton. One quartz mill is contracted for and others are in prospect.

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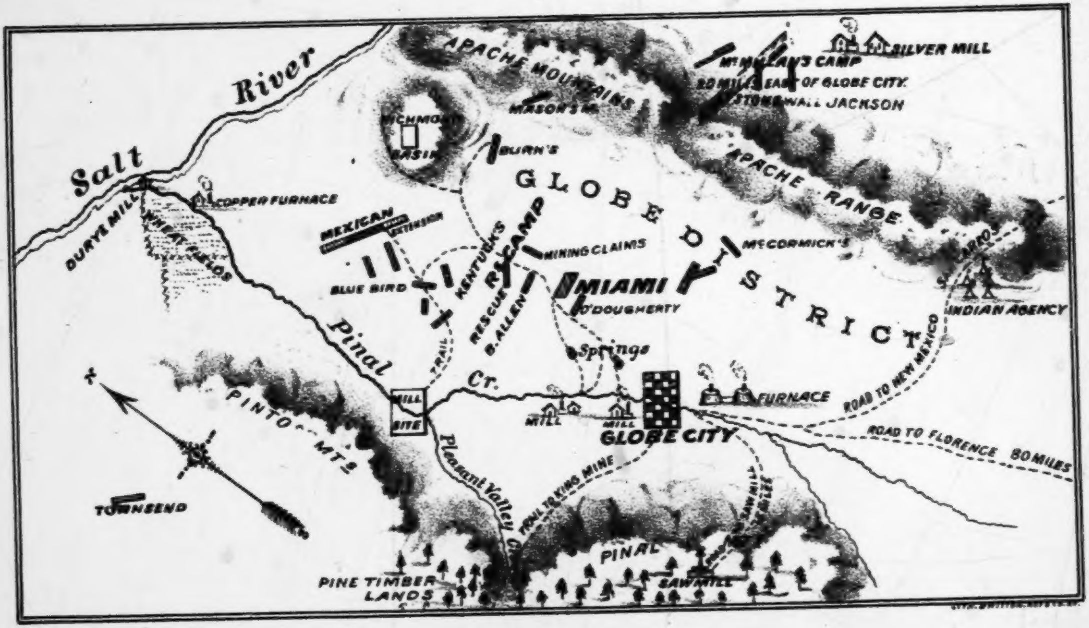
*There are notes of a Silver King district being set off, which the Editor is unable to verify.

Twelve miles from Florence on the road to Globe city, the ascent of the utterly barren Mescal range commences; a few miles further on is a high elevation or mound, covered with large cottonwood trees, and abounding in springs, though not a drop of water can be obtained in any direction for miles around on lower ground. At about 5 P. M., the stage which leaves Florence in the morning reaches the Mescal summit, whence the thickly timbered mountains of the Pinal range are distinctly seen across the picturesque valley in which the station of Dupping Springs is located. Here are numerous small streams issuing from rocky mountain crevices, and falling over a hundred feet. From this verdant valley the road ascends the Pinal range, from which can be seen for miles the winding road over the Mescal mountains previously traversed, markedly contrasting in its barren ruggedness with the green groves of the Pinal. The road sometimes keeps along the bed of Pinal creek, shaded by abundance of oak, walnut, ash, sycamore, pine and cottonwood; then comes a slight ascent, and in a rolling valley grows a thick shrubbery of mescal, manzanita and iron-wood, parasitically and profusely covered with grape vines. Long and dry but nutritious grass abounds on the hillsides. In the higher portions of the range are tall pines and firs, and in the less frequented parts abundance of wild turkeys. Here the great Gila valley is seen, winding its way between hills and mountain gorges until lost in the distance, the jagged peak of Mount Turnbull shooting up to the south of the Gila 8,000 feet above sea level. Alternating between the rolling mountain valley above described and the banks of Pinal creek, Globe city is reached on the second day from Florence, the distance by this new road being shortened down from 120 to about ninety miles. The mineral belt of which it is at present the business centre is about twenty miles in length by two to five in breadth, running the former distance north-easterly through the Globe and the Stonewall Jackson districts, on the west and east sides of the Apache mountains. On this belt locations have been made for nearly the whole distance, and at intervals quantities of almost pure silver have been taken out. The ores may be divided into (1) free-milling ores, containing chloride, bromide and iodide of silver; (2) silver ores which do not work well by raw amalgamation; (3) cupriferous ores, containing sulphur, carbonic acid, silurium, arsenic, and gray copper ore, requiring roasting in order to be treated successfully. There are no smelting ores in the district; and the want of fire-clay and lead, together with the scarcity—in a few localities—of wood and water, are great obstacles to its mining development. Clay for furnaces is hauled over two hundred miles; lead is obtained from the Yuma mine, near Tucson; but its place is partly supplied by means of a natural eccentricity, consisting of large deposits of micaceous oxidised iron, which has proved to be an excellent flux for quartz ores, though micaceous iron is in general almost infusible. There are statements to the effect that anthracite coal has been discovered in some portion of this mining region, a mass having been exposed 120 feet in breadth by a mile in length. In the western portion of this mineral belt are found green carbonate, and red oxyd of copper, running from 30 to 80 per cent., and carrying in some cases $200 to $400 per ton in silver. North-east from the copper lodes is the silver-producing section, where the veins are from two to eight feet in width, the ores ranging from $75 to $300 per ton. At Rambo's camp, five miles from Globe city, the ores are reported to yield from 200 to 400 ounces per ton; but two mines claim $1,300 and up to $4,000. At Richmond Basin, twelve miles from Globe city, in a small depression on the west base of the Apache mountains, are several placer and other mines, from which large amounts have been taken of ores producing from $5,000 to $15,000 per ton; in the flat ledges are found in large quantity chloride and horn silver lying next to the bed rock, above which is a stratum of loam three to ten feet in depth, yielding $100 to $300 per ton. The products of some of the mines are stated in detail per ton at 100 ounces, 700 ounces, 100–250 ounces; $1,000 to $2,000; 2700 ounces; 300 to 400 ounces; $1,200 to $2,000; $400, (picked); $21,000; 150 ounces; 100–125 ounces; 160 ounces; 100–150 ounces. The valuations of three for sale are $6,000, $20,000, and $60,000. One silver nugget from the Burns mine contained $1,000.

On the eastern slope of the Apache mountains are several highly remunerative mines, the crown of which is the celebrated Stonewall Jackson. This and adjacent mines in the McMillan camp had, some months since, produced $352,000 in silver, on an expenditure of not over $75,000, with millions in ore in the Stonewall Jackson in sight, estimated to be worth $15,000 to $20,000 per ton. An assay from the best ore gives $32,486-92-100. The first mine discovered in that locality was the "Champion," located late in 1875, situated on the south-western slope of Chromo Butte, by which this, the Stonewall Jackson, district is divided from the San Carlos reservation. This mine is on the north-eastern border of the mineral belt crossing the Globe and Stonewall Jackson districts. The "Champion" vein is about three feet in width, between walls of grauwacke; the gangue is mostly sulphate of baryta, silica mixed with carbonate of lime and argillaceous earths, and is in a high state of crystallization, producing large and beautiful specimens of crystalized chloride of silver, brittle sulphuret of silver, silver glance, (argentite) and, as a result of the decomposition of the two latter varieties produced by surface influences, black sulphide of silver. Free gold is found in this fissure vein chiefly confined to rocks of quartzose character. Very near the Gen. Lee mine, McMillan & Co. recently struck a six-inch vein of solid chloride worth eight to ten dollars per pound.


Salt River
DURYE MILL
COPPER FURNACE
WHEAT FIELDS
APACHE MOUNTAINS
RICHMOND BASIN
MASON'S
BURN'S
McMILLAN'S CAMP
20 MILES EAST OF GLOBE CITY.
STONEWALL JACKSON
SILVER MILL
APACHE RANGE
GLOBE DISTRICT
McCORMICK'S
SAN CARLOS
INDIAN AGENCY
MEXICAN
EXTENSION
BLUE BIRD
KENTUCKS
RESCUE
R. CAMP
B. ALLEN
MINING CLAIMS
MIAMI
O'DOUGHERTY
Springs
TRAIL
Pinal Cr.
MILL SITE
MILL
MILL
GLOBE CITY
FURNACE
ROAD TO NEW MEXICO
ROAD TO FLORENCE 80 MILES
PINTO MTS
TOWNSEND
Pleasant Valley Cr.
TRAIL TO KING MINE
PINAL
SAWMILL
PINE TIMBER LANDS

GLOBE DISTRICT

Early in February, 1876, the Almaden, Little Mary Ann, St. Louis, Little Mac, and many others were located, but held back in their development by want of means, and by the enormous prices then (perhaps still) exacted for supplies; such as $15 per 100 pounds for flour and beans, fifty cents per pound for sugar and bacon, etc. A correspondent thereon bases the conclusion that "small towns are capable of holding mighty small people"; that though "scientific men, so-called, have made stupendous mistakes of judgment, they have been surpassed by the mistakes of practical men, so-called. The scientific man without practice, and the practical man without science, the honest man without the means, and the smart man without honesty, have done so much to destroy the mining interests of Globe mining district, that the mere fact of its continued existence, after such trials, is proof of its inherent stability and future prosperity." The application of these remarks is capable of considerable extension.

As respects climate, these districts appear to be highly favored, work, even in the hottest weather, involving no loss of strength or appetite. The difference between this region and Florence in that respect is very marked. Unlike most of the mining region east of the Nevadas, the country is also well adapted to the pursuits of agriculture, so that in Globe city, and one or two other points, milk, fresh butter, watermelons, vegetables and fresh meats are readily obtainable. In this direction there are probably good openings in other portions of these and in adjoining districts for competent farmers. Of smelting works, mills, etc., there are several in the Globe and Pioneer districts, but, as elsewhere in Arizona, they are entirely inadequate to the demand.

One mile south of Oak Grove station, which is twenty-two miles south-by-east of Globe city on the road to Florence, new discoveries of silver ore were recently made directly on the road, and on July 6th, 1877, the locality was dubbed the Summit mining district. The altitude is 7,000 feet above sea level, and a perpetual mountain breeze renders the climate delightful. Mr. Charles Putnam, one of the proprietors of the new toll-road, resides here; he has a number of fine blooded cattle and plenty of milk and butter.

Mineral (or Mineral Creek) district is eighteen miles west of Globe city, and was organized in September, 1877, based on discoveries made by Thomas G. Newland. The lodes are large and well defined, assaying $100 to $1,000 in silver.

The districts and localities hitherto specified in these counties are nearly or quite contiguous. There are others which are at present isolated from these and from each other. Crossing Salt river, in the Tonto basin, Maricopa county, four miles from Green valley, a large gold ledge, reported to assay into the thousands, has been discovered; on the heels of which a mountain of silver ore assaying $175 per ton is also reported, with all the conveniences for working them close at hand, including excellent facilities for stock-raising which the valley is reputed to possess. This basin was once the home of "Big Rump," an Apache chief, who, for several years during the first settlement of central Arizona by Americans, was a terror all over it, until killed by Col. Sanford, near Wickenburg, just after he had murdered Col. Snively, the discoverer of gold at Pinos Altos, New Mexico.

The Cave creek gold region is about thirty miles north of Phœnix, on a tributary of the Agua Fria, and corners on the Humbug mining district of Yavapai county. Large and rich ledges of gold-bearing quartz are claimed to have been discovered by several persons, and some shafts sunk 180 feet. Mr. Rowe has been working the "Lion" gold mine there for two years by arrastras; and another mine in this district is reported to have been sold for $17,000. The Golden Star has been bonded by Geo. D. Roberts for $75,000.

The Vulture mine, variously reported to have been discovered by Herman Ehrenberg and Henry Wickenburg, (another well known Arizona pioneer, after whom the town of Wickenburg was named) is one of the best known mines in the territory. It was discovered in 1863 and worked continuously until about four years since, when, for some cause yet unexplained, it was "shut down." More work has been done in it than on any other mine within the territory. It is located near the Rio Hassayampa, about twelve miles south-west of Wickenburg. The reduction works, now idle, except as to working the tailings over, are within two miles and to the north of the same place. It is reported recently that work has been or is to be resumed. It is clear that this mine is a true fissure-vein of large proportions. The depth attained is 312 feet below the surface of the mesa, or fully 390 feet below the croppings of the lode. At a depth of 232 feet below the surface of the mesa the fissure was found to change from a dip of 45 degs. north-north-east to an almost vertical position. The vein proper is thirty-nine feet wide, continues 100 feet below; the hanging wall is of porphyry, foot wall of talcose slate, vein has a pitch of 45 degs. to the north-west. Two mills have been constructed near Wickenburg for working the ore, one of forty stamps and another of twenty. The latter (Smith's) employs thirty men, running day and night on rock averaging $28.25 per ton. The best body of ore taken from the mine was found just above where the fissure changed its dip. Water is brought by flume from Hassayampa dip, a distance of seven miles. It has a fall of thirty feet to the mile, and also supplies the Smith mill with all the water wanted. The mill has twenty stamps and is very perfect in its appointments. All the buildings requisite for the business have been erected, and all necessary improvements have been made, such as boarding-house, men's quarters, assay-office, carpenter and blacksmith shop, office, warehouse, and store. Four Hepburn pans have recently been placed in position, which are expected to extract from some ten thousand tons of tailings that have been accumulating for some time about $400,000 worth of metal. They will be worked entirely by pan process without any furnace or smelting works.

The Maricopa lode (Gray's mine) is seventy miles directly north of Tucson and four south of the Gila. It is in Pinal county, and was once regarded as the finest copper deposit in the territory. It contains also a large percentage of silver. Frederick Brunckow reported, in 1860, that there were ores in this lode of four classes or grades: 1. Fahl ore, mixed with carbonate, containing to the ton fifty per cent. of copper and 104 ounces of silver. 2. Gray sulphurets, containing sixty per cent. copper and ninety-three ounces of silver. 3. Copper silicate, containing twenty to twenty-five per cent. of copper and twenty to twenty-five ounces of silver per ton. 4. Carbonates, twenty-five to fifty per cent. of copper, and only a trace of silver. Although nothing has been heard from this mine of late years, it is presumed that, whatever the Apaches may have done with the owners or employés, their means of transportation were inadequate to carrying away the mine itself, and that the three-fold cord of capital, labor, and enterprise conjoined will once more bring its treasures into the light of day.

From superabundant nomenclatures and the frequent segregation of new districts out of old ones, it is probable that some of the mines in the following tabular statement of those in Pinal and Maricopa counties may be located in the wrong districts, notwithstanding every effort to the contrary. From many districts clear and comprehensive statements have been received; but from others the information obtained from obscure and incidental reports has had to be carefully collated, and is probably not free from unavoidable error. Up to October 1st, 1876, 200 mining locations had been recorded in Maricopa county, and 552 in Pinal county.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Product per Ton.	Assays per Ton.	Remarks.
Alice Bell	Silver King				
Almaden	Globe				Apache Mtns., Maricopa Co.
Amador	Silver King				
Arko	Pioneer (?)			$800	Assay from croppings; ledge 20 to 25 feet high.
Athens	Silver King	C. Brown & Co.			1st Ext. S. of Silver King; ¼ mile S. of Seventy-six.
Aztec	Globe				
Babe	Pioneer	Beeler, Reymeret & Van Hasslocher.			
Baldwin	Pioneer				
Baltimore	Pioneer			$500–$2,000	
Barnes	Silver King				
Barney's	Globe		$4,000		Placer; ten tons sent to S. F.
Beardsley's	Richmond Basin, Globe.		150 oz		4 to 5 ft. vein.
Belcher	Pioneer			$1,126	Carb. and chloride; free milling.
Belladonna	Pioneer				Next Silver Queen south; ledge here broken by cañon.
Ben. Franklin	Silver King				
Bilk	Silver King			$100–$500	Across cañon fm Silver King Camp.
Bixby	Globe (?)		$1,000		6 m. from Globe City; 8 men get out 10 tons daily.
Black Cañon	nr. Shuter's Mill	B. Muk			
Black Cloud	Silver King				
Black Jack	Ten miles S. of Wickenburg.				Arg. galena.
Blue Bird	R. Basin, Globe		90 oz		4 to 5 miles from Globe City; 16 in. vein; 60 ft. shaft.
Blue Cap	Globe.			$500–$5,000	Silver; 3 ft. vein.
Bon Ton	Silver King				

Bowman	Pioneer				
Brilliant	Globe	Wilson & Boyaga.		$200-$2,500	4 m. N. W. of McMullin's; 7 m. N. E. of Richmond and Chilson Mines, and in same belt; 5 ft. ledge; 10 to 15 in. pay ore.
Buckeye	Richmond Basin, Globe Dist.		100 oz		2 ft. vein; 80 ft. shaft.
Burns	R. Basin, Globe		150 oz		3 ft. vein; silver nugget, $1,000; 4 cuts.
Byron	Globe (?)				3 m. S. of Silver Belle, Savage, etc.
Cadmus	Globe	San Fran. Co., Haskin, Supt.			Near Globe City; silver and copper; ore shipped to Yuma.
California	Silver King				
Casket	Globe (?)				4 to 5 miles from Globe City.
Cecilia	Silver King				
Cedar Hill	Globe or Pion'r				
Centennial	Globe	Wilson & Gibbons.			3 shafts.
Champion	Richmond Basin, Globe,	J. D. Wilson & Co.	150 oz		12 m. from Globe City; 3 ft. vein; shaft 60 ft.; mill at mine.
Chillison's	R. B., Globe		150-800 oz		Mill.
Christmas	Silver King				
Chromo	Globe	Beardslee & Moore.			Apache Mountains, Maricopa Co.
Cook's	Globe			$1,200-$3,000	Placer.
Copper Top	Pioneer	Barney, Reagan & De Free.			600 yards west of S. B. Farnham; extension of Silver Queen; gray carbonate.
Crown Point	Silver King			$1,126	Free milling; carb. and chl.
Democrat	Globe			$2,000	1st N. Ext. Stonewall Jackson.
Democrat	Silver King	King & Dickens			1st NE. extension of Little Mac; 1,000 oz. taken out in 2 days by one man.
Dickey & Alvaneys	Globe			$300-$400	2 to 6 in. strata; placer.
Duryea	Globe				2 stamps; steam pressure mill, grinds 20 tons in 24 hours.
East Union	Silver King				Across cañon, NW. from Silver King Camp.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Product per Ton.	Assays per Ton.	Remarks.
Emma		W. G. Garrett			Silver in ledge similar to Randolph, which it intersects 2 m. NW.; all located.
Empire	Pioneer	Hine			E. of Wanawhatta.
Essex	Pioneer		$100 to $500.		Across cañon from Silver King camp.
Eureka	Pioneer				Shaft and tunnel.
Fernandez	Silver King				
Flagstaff	Pioneer				
Florence Adams	Silver King				
Ford's	Globe			$1300	Shaft.
Friday	Globe	Frank Riggs		$1000 to $2000	5 ft. vein.
Gem	Pioneer	D. M. Hyde			
General Lee		Incorp. Comp'y	$1300		6 foot vein.
Germania	Pioneer	Smith & Lamplar.			
Gift	Pioneer				
Gila Monster	Cave Creek	McDonald & Hicks.			Shaft.
Glasgow	Pioneer				South-west of Idlewild.
Globe	Globe		40 to 80 p. c.		Copper.
Golden Eagle	Cave Creek	McDonald & Hicks.			
Golden Star	Cave Creek	W. B. Hellings			Bonded by G. D. Roberts.
Goodenough	Pioneer				
Grand Prize	Globe				
Grand Turk	Pioneer				
Gray's Mine	Maricopa Lode			25 to 100 oz. silver, 20-60 p. c. copper	1860; 70 m. N. of Tucson, 4 m. S. of Gila.
Ground Hog	Silver King				
Guanajualo	Silver King	Connelly		$3,000	True fissure vein, 4 feet wide; next Silver Queen.

Hamilton	Silver King				
Hamilton South	Silver King				
Hannibal	Globe				E. slope of Apache Mtns., Maricopa County.
Hard Cash	Silver King				
Hardesty	Silver King				
Helen	Globe	Alvaney & Dickey.		$8,000	3 ft. vein; shaft; chloride; nugget and horn silver; disc. February, 1876.
Helpmate	Silver King				
Hercules	Silver King				
Hidden Treasure	Randolph or Pine Grove.			$460	
Hoo-doo	Silver King				Placer.
Hope	Pioneer				
Hundred-and-One	Globe	Moose, Hyatt & Webster.			
Hyde	Pioneer				
Idlewild	Pioneer				Tunnel.
Imperial		Chas. Mason & Bros.			$10,000 in sight.
Isabella	Globe	A. L. Byron			
Josephine	Silver King	S. B. Farnham			
Justice & Thompson	Pioneer				
Kelly's	Globe		80 oz.		Extension of Mendoza's Mexican Ledge, 4 ft.; shaft.
Kentuck	Randolph, Pine Grove, or Reynolds.	Robt. Lemon		$500-$4,000	1 ft. vein; rich croppings; shaft.
Knickerbocker	Pine Grove or Randolph.				Rich croppings.
Last Chance	Pioneer or Silver King.			$100-$500	Across cañon from Silver K'g Camp.
Lazy Bob	Richmond Basin, Globe.		150 oz.		Maricopa Co., W. Slope of Apache Mountains; 2 ft. vein; shaft.
Lewis	Pioneer				Extension of S. B. Farnham south.
Lion	Cave Creek, Maricopa.	Ed Rowe			Arrastras.

NAME OF MINE.	District or Placer.	Owned or Leased by.	Product per Ton.	Assays per Ton.	Remarks.
Little Mac	Globe	Stonewall Jackson Co.			Apache Mountains, Maricopa Co.; 19 miles from Globe City.
Little Mary Ann	Globe				Same as above.
London	Silver King				
Manhattan	Pine Grove, or Randolph.				40 m. N. of Florence; rich croppings.
Maverick	Silver King				Nuggets frequent.
Meteor	R. B., Globe	Eppley Bros	160 oz		SW. Ext. of Lazy Bob; west slope of Apache Mts., Maricopa Co.; vein 3 ft., pay streak 6 in.; shaft 85 feet.
Mexican	Globe	Mendoza	200 oz		Vein 3 ft.; arrastras; shaft 45 ft.
Miami	R. B., Globe	Chapman & Co.	150 oz		Rambo's camp, 5 m. from Globe City; shaft and drift; 10-stamp mill; 15 tons in 24 hours.
Mogul	Silver King				
Monarch	Globe	Moose, Hyatt & Webster.			
Monday Morning	Silver King				
Montezuma Ledge	Silver King				Well defined.
Morning Star	Pioneer	J. P. Gabriel			
Mountaineer	Silver King				
Mount Morris	Globe				
Mun Shunk (?)	Pioneer	S. B. Farnham.			
Munson	R. B., Globe		400 oz		Shaft.
Nabob	Silver King				
Ne Plus Ultra	Pioneer	S. B. Farnham.			
New Philadelphia	Silver King				
Northern King	Pioneer				Drift; shaft, 137 feet.
Oakland	Pioneer	D. H. Crocker.			
O'Doherty	Globe				Near Globe City.
Ohio	Pioneer				

Pacific	4 m. N. W. of Camp Pinal.	C. E. Buck.			
Peach Orchard	Pioneer			$100 to $500	Across cañon, NW. from Silver King Camp.
Pelican	Silver King				
Pike	Silver King				
Pinal	Silver King				
Promo	Pioneer				Crosses the Arko like a letter X; carbonates.
Queen Creek	Pioneer				Sold to a Californian for $40,000.
Rambo	Globe				
Randolph	Randolph, Pine Grove or Reynolds.	W. C. Garratt			50 ft.
Ranger	Pioneer			40 p.c. copper; $50 silver.	Ledge 20 feet wide, 800 feet long.
Reading	Silver King				
Red Cross	Globe				60 ft. tunnel.
Redeemer	Silver King				
Republican	Silver King				
Rescue	Globe	J. D. Wilson & Co.		$300 to $15,000	5 m. from Globe City; 3 ft. vein; 30 ft. shaft.
Richmond	R. B., Globe	McMorris & Cook.		2700 oz.	3 ft. vein.
Rising Sun	Silver King				
Robert Allen	Rambo's Camp, Globe.		200 oz.		5 m. from Globe City; vein 2½ feet; 55 ft. shaft.
Rob't E. Lee	Globe (?)	Flourney & Scott.			
Rowan	4 miles N. W. of Camp Pinal.	Hayes & Buck.			
Ryan's	Silver King				
Saddle Rock	Pioneer (?)				
Saint Louis	Globe				Apache Mtns., Maricopa Co.
Saloma	Globe				2 m. E. Globe City; native silver.
Savage	Globe				South of Silver Belle.
S. B. Farnham	Pioneer	Idlewild Co.			Extension of Wanawhatta.
Scott's	Globe		$400		

NAME OF MINE.	District or Placer.	Owned or Leased by.	Product per Ton.	Assays per Ton.	Remarks.
Scratch	Silver King				
Seventy-six	Silver King				In line with Upper Crust.
Shasta	Globe (?)				Same belt as Solano, Cadmus, and O'Dougherty.
Sherman	Globe				5 m. from Stonewall Jackson, 12 m. from Globe City; Apache Mts., Maricopa Co.
Silver Belle	Pioneer	Whitlow & Co.	$400 (?)	$800–$3,000	4–5 m. from Globe; next S. of Eureka; free-milling ore.
Silver Chief	Pine Grove (or Randolph).				Nugget 450 pounds, half silver.
Silver Chief	Silver King				
Silver Cloud	Silver King				
Silver Coin	Pioneer	D. M. Hyde			
Silver Cross					Next Upper Crust; tunnel.
Silver King	Silver King	Reagan, Long, Barney et al.	$1,000–$20,000		30 m. NE. Florence; vein 87 ft.; said to produce $750,000 per annum; shaft, 250 ft.; 3 levels; mill at mine; concentrators at Picket Post, 4 miles.
Silver King (North)	Silver King	Incorporated Company.			Vein 40 feet wide; shaft, 240 feet.
Silver King (South)	Silver King			$500 (?)	Tapped vein, which runs N. and S., at 66¼ ft.; hanging wall; 2 shafts and drift.
Silver Queen	Pioneer	Barney, Reagan, DeFree.		$25–$100 silver.	Silver, and considerable copper; tunnel 80 feet; smelting works in progress.
Silver Star	R. B., Globe				1 ft. vein; low grade; milling ore.
Sky Blue	Pine Grove (or Randolph).			$460	
Southern Belle	Pioneer				South of Savage.

Stonewall Jackson	Globe	Incorp. Comp'y	$1700 and up	$15,000-$24,000	19 m. fm. Globe City; shaft, 4 drifts, and tunnel; 5 stamp mill.
Styles	Silver King				
Summit	Silver King				
Sunrise	Pioneer				
Surprise	Silver King	Richmond & Welsh.		$100 to $500	Across cañon, NW. from Silver King Camp.
Surprise (S. extension)	Silver King				
Susy	R. B., Globe	F. Riggs		$1,000-$2,000	5 foot vein.
Tonto Basin Mines				$175	Maricopa Co.; large ledge; recently discovered.
Townsend	Globe			$89 gold, $81 silver.	Antimonial lead ore; 10 stamp mill.
Treasure Vault	Globe				Apache Mountains, Maricopa Co.
Upper Crust	Silver King				Adjoining King Mines.
Union	Cave Creek, Maricopa Co.	McDonald & Hicks.			Shaft.
Vulture	About 15 m. S. of Wickenburg.		$35 surface ore.		Discovered in 1863; 2 to 20 ft. vein; 2 mills at Wickenburg.
Wanawhatta	Pioneer	Conolly Bros.			
Washington	Silver King				
Webbs	Globe, R. B	Mason		$21,000	1 shaft; sold to Mason for $25,000; 3 miles E. of Richmond Basin.
Webfoot	Pioneer	Dore			South of Empire.
Wedge	Silver King			$100-$500	Across cañon N. W. fm. Silver King Camp.
West Union					
Wheatfield	Globe				Copper; said to assay high in gold and silver.
Wheeler	Pioneer			$200-$400	Same belt as Silver Queen; gray carbonate.
Wild Apache	Silver King				
Wonder	Silver King				
Wyoming	Silver King				
Yankee Boy	Pioneer	Baker			Extension of Silver Queen; gray carbonate.

In Yuma county American mining enterprise dates as far back as 1858, when Jacob Snively discovered placers at Gila city, twenty-four miles east of Yuma. Within three months of their discovery over a thousand men were at work there; the diggings continued rich for four years, and have been continuously worked on a smaller scale up to the present time. Recently there has been a revival of interest caused by new discoveries, and a company has been formed to take a ditch from the river and work its bed by pumping, etc., as done on the American river and elsewhere in California. The Alva mine, (Montezuma district) near Gila city, has argentiferous copper ore, yielding, it is claimed, $100 per ton in silver.* The Castle Dome district lies on the western side of the range so named, and north-east of Yuma. There are about forty locations, nearly all of which are worked to some extent. Most of them are located on six parallel veins, and all contain argentiferous galena. Messrs. Miller & Hopkins have sunk shafts to a depth of 250 feet, and stopes have been opened and partly worked out on the 60, 100, 160 and 220 foot levels. The ore has been shipped for reduction to San Francisco, where early in 1875 the owners of the mine erected a smelting furnace, after which they erected furnaces at Castle Dome landing, on the Colorado river, forty miles above Yuma and twenty miles from the mines.

The following from Lieutenant Wheeler's Report, (1876) was prepared by George H. Birnie, Esq., in March of that year. It is so full that it has been deemed best to insert it here in part:

"A geological investigation has been made by Professor Blake, of Connecticut. The lodes are found to run north 25 degs. west. Some follow and others intersect the stratification. The rich veins are found in fluor spar or talc. The wall-rocks are of mixed slate and porphyry. They are perpendicular, with an east and west slope. Fissure-veins are found at a depth of 350 feet. The country rock is basaltic. No fossils occur. The ores are worked by smelting and by the process of iron precipitation. The ores are galena, carbonate of lead, and anglesite. An average yield of thirty-two dollars per ton in silver is obtained. Lead forms sixty-seven per cent. of the ore. Iron is the other base metal. Traces of gold are found. Water has not yet been reached.

"The principal mines are the Flora Temple, Castle Dome, William Penn, Caledonia, Don Santiago, Little Willie, and

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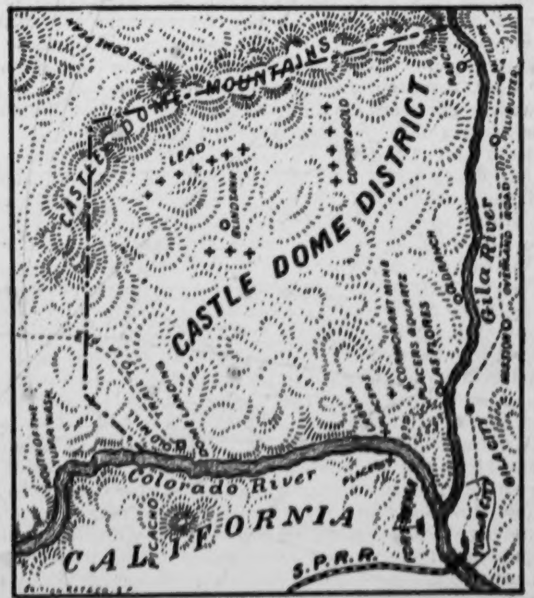
*In the Cargo Mucacho district, California, eight miles west of Yuma, wonderful discoveries are reported.

Norma. The general character of the ore is the same throughout all of these, except the Castle Dome and Caledonia, in which anglesite and carbonates are found. Their claims vary in extent from 200 feet by 1,000 feet to 600 feet by 1,500 feet, and lie in the foot-hills and the mountains above. From the main lodes about 6,000 tons of ore have been extracted and taken away for reduction, at an expenditure of about $200,000. On the Colorado river, eighteen miles from the mines, the Castle Dome Smelting Company has a blast-furnace, with an engine of 20 horse-power. Its capacity is 20 tons per diem.


CASTLE DOME PEAK
CASTLE DOME MOUNTAINS
CASTLE DOME DISTRICT
LEAD
Gila River
Colorado River
CALIFORNIA
S.P.R.R.
PICACHO
OVERLAND ROAD

"The cost of a furnace constructed at the mines would be $12,000. Other expenses average as follows: Cost per ton for mining the ore, $8; for reducing the same, $9; mining labor per diem, $2; smelting labor, $2; running a tunnel on main vein, $3.50; sinking a shaft, $4; running a drift, $3. One man can stope from one to five tons of ore per diem, according to the size of the vein, or can extract six tons per diem. Expense will be reduced by the completion of the Southern Pacific Railroad to the Colorado river.

"There are a few horses, mules, and burros in the vicinity. There are no facilities for raising produce. Barley is worth four dollars per hundred-weight. Alfalfa, wheat, corn, oats, sugar-cane, vegetables, cotton, fruits, and wild hemp can be procured at Yuma. The varieties of timber are cotton-wood, suwarrow, iron-wood, willow, and mesquite. Water is scarce. the nearest supply being a good well ten miles from the mine. The deer, mountain-sheep, antelope, quail, rabbit, and hare abound. There are 200 inhabitants in the district, beside the same number of Date Creek Apache Indians."

In the Eureka district, next above Castle Dome, several mines are in operation, the ore is argentiferous galena with a show of gold, the lodes are in the mountain ranges one to twenty miles east from the river bank. The country rock is granite and slate, the silver veins are in pink and white quartz, and the copper indications numerous.

The character of the ores in the Weaver district, next northward, is about the same. The Colorado mine there, still in operation, in 1867 yielded thirty-one per cent. of copper and sixty-eight ounces of silver to the ton. In January, 1862, Captain Pauline Weaver discovered gold placers seven miles east of La Paz, and before the year was out fifteen hundred persons were on the ground, most of whom had left by the spring of 1864, but a few remained several years later. It is estimated that gold to the amount of a million of dollars in value was taken out during the first year. Recent placer discoveries rich in gold dust, over an area of forty miles by fifteen, with nuggets of two to ten dollars, are bringing back to the vicinity of Ehrenberg miners who operated there in the former period, and many abandoned mines are being taken up again by their former owners. With improved processes and cheaper supplies a revival of former prosperity may be anticipated. The scarcity of water, however, necessitates recourse to dry-washing processes. The primitive rocks of the Riverside and Half-way mountains, which border the Colorado river on the west, just above Ehrenberg, consist of granite and gneiss, the latter garnetiferous.

Between Ehrenberg and Williams Fork, the northern boundary of Yuma, nearly all the mountains have decided metallic indications. The richness of the placers above mentioned suggested prospecting for quartz lodes, which commenced in 1863 and resulted in the discovery of some gold and silver mines from six to thirty miles east of the river; not rich, however, for Arizona mines, though they might have been considered profitable elsewhere.

The Harcuvar district, in the mountain chain of that name, is not much heard from at present, but was reported on at length by Mr. Ehrenberg several years ago. He states that the group of copper lodes in that range are eighteen in number, aggregating 51,200 lineal feet, which he considers to comprise not only large but permanent veins. The country rocks are granite and gneiss, fractured at right angles to the plane of stratification. The fissures are nearly perpendicular, varying from five to fifteen feet in width. The vein mass consists of calcareous spar, tinctured green by the mixture of talc in small quantities. It is distinctly separated from the connecting rock by a narrow selvage of a ferruginous substance, colored by hydrated oxyd of iron. The sheets of ore are compact and continuous, the mass of the gangue being found near one of the walls. Assorted ores taken from this group have been shipped to Swansea, and worked 37½ per cent. Assays range from 30 to 70 per cent.

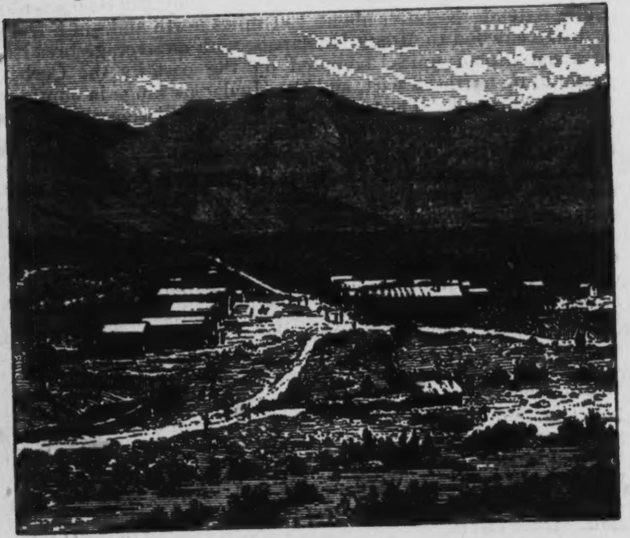
In reference to the country on both sides of Bill Williams Fork, a mineralogical observer writes: "One of the best evidences of the value of the copper deposits of that region is that they are massive, solid, and regular, whilst in the deposits the least infiltration is impregnated with carbonates. The outside gossan is usually of specular or magnetic iron, which is invariably found adjacent to the surface. Such is the character of the richest mines the world over."

The Planet lode was discovered about three-quarters of a mile south of Bill Williams Fork, twelve miles east of Aubrey on the Colorado, in 1863. A company was formed in 1864, and since 1865 the mine has been worked at intervals, yielding an aggregate of about 8,000 tons of copper from ore of twenty to sixty per cent. in richness. The scarcity of wood and water and a present deficiency of farming supplies in Yuma county are great drawbacks to successful mining; but as the means of communication are opened with the mines of Pima, Pinal and Maricopa counties, where lead is needed to flux the ores, it is probable that the galena ores in this county will be more extensively and profitably worked than hitherto. Of 580 mines located and recorded in the county up to October 1st, 1876, the following are all of which we can obtain any particulars:

NAME OF MINE.	District or Placer.	Owned or Leased by	Product per Ton.	Assays per Ton.	Remarks.
Apache Chief	Nr. Ehrenberg.	....	....	....	Copper.
Big Dome	Castle Dome	E. Battis	Lead, 30-60 p. c.; silver, 20-30 oz.	....	Argentiferous galena; 3 ft. vein.
Bonanza King	Culling Stat'n, 3 m. f'm La Paz	....	....	....	....
Bronze	Eureka District	....	....	....	Argentiferous galena.
Buena Vista	Eureka District	....	....	....	Argentiferous galena.
Buckeye	Castle Dome	Miller, Berry & Co.	25-30 oz. silver; 30-65 p. c. lead.	....	4 ft. vein; argentiferous galena.
Colorado	Weaver	....	30-70 p. c. copper; sil. 68 oz.	....	Copper, gold, and silver.
Cortez	Castle Dome	....	30-60 p.c. cop. 30-45 oz. sil.	....	....
Ellen Gowan	Castle Dome	W. O. Miller	30-45 p. c. copper; 60 oz. silver.	....	....
Flora Temple	Castle Dome	N. Gunther & Co.	30-65 p.c.lead; 25-30 oz. sil.	....	Argentiferous galena; 4 ft. vein.
Little Willie	Castle Dome	W. P. Miller & Co.	30-65 p.c.lead; 20-30 oz. sil.	....	Argentiferous galena; 2½ ft. vein.
Margarita	Eureka	....	....	....	Argentiferous galena.
McLane	Castle Dome	....	30-65 p.c.lead; 20-30 oz. sil.	....	Argentiferous galena; 4 ft. vein.
Montezuma	Castle Dome	Miller & Minear	30-60 p. c. copper; 30-45 oz. silver.	....	....
Morena	Nr. Ehrenberg.	Lusk & Co.	....	....	Copper.
Planet	Bill Williams District.	....	....	....	6 ft. vein.
St. Charles	Castle Dome	....	30-50 p. c. copper; 100 oz. silver.	....	
Vernon	Eureka	....	....	....	Argentiferous galena.

Nine distinct mountain ranges, running north and south, mark the topography of Mojave county with distinctive features. The first back of the river extends from the Needles to the Great Bend between Black and Boulder cañons, touching the river at each extremity. The northern part of this range is called by Lt. Mallory, of the Topographical Engineers, the Black Cañon range, and the southern the Blue Ridge mountains. To the east of this range Death valley and Sacramento valley extend, the latter about 150 miles north and south from near Greenwood to Mount Hualapais, with an average breadth of about fifteen miles, bounded on the east by the Cerbat range in its northern part, and the Hualapais range in continuation southward. These ranges are about twenty miles in breadth from foothills to foothills. The country rock is granite, slate and porphyry, varying in the different localities. The geology is regular. The tops of the high ridges are covered with large pines, and the valleys and ravines with scrub cedar, oak, birch, and alder; water is abundant in the ravines, and there are both springs and running brooks, and in the rainy season water-power. The mining districts on the slopes of these ranges, and their intervening elevated valleys, present a network of veins carrying a wealth of silver which cannot be estimated. The rock is azoic, the veins chiefly quartz, dipping at an angle of 70 to 80 degrees. The earliest prospecting was done in the Sacramento valley in the years 1857 and '58, but the first band of real prospectors entered the Hualapais (the Sacramento) district in 1863, when over 2,500 locations were made. Still the Indians were so bitterly hostile that the real settlement of that and adjoining districts did not commence until 1871. In 1872 a mill and furnace were started. The ores mostly require roasting, chloridizing, and amalgamation. Over one hundred mines have been located in the Hualapais mountains, many giving valuable indications of gold and silver, but few have been developed to any great extent. Among these few are the Dean, (gold) and American Flag, (silver) the latter being on the summit of the mountains, thirty-five miles south-east of Mineral Park.

In the primitive rocks of the Cerbat range, farther to the north, occurs muscovite in large plates. In these rocks, not only in the Cerbat range, but in the Black Cañon and other ranges to the west, on both sides of the river, metalliferous lodes occur. For over thirty miles in length the Cerbat mountains abound in valuable mineral veins of gold, silver, and lead, in which hundreds of mines have been opened. A five-stamp quartz mill was started at Mineral Park early in 1876, prior to which time mining was greatly impeded by the lack of such facilities. Cerbat, the county seat, is six miles to the south of Mineral Park. Within a mile or two of Cerbat are some flourishing mines—the New York, Fontenoy, Sixty-three, Mocking-Bird, and others, that are in paying operation, giving from $142 to $600 per ton silver. The Mocking-Bird has a two-foot vein



MINERAL PARK.

of gray and blue sulphurets, inclosing specimens of green horn silver. In the immediate vicinity of Stockton Hill, three miles north-east of Cerbat, are several silver mines, the ores from which average $200 per ton, and a number more assaying from $100 to $1,000. Two and a half miles north of Cerbat is the Oro Plata, a gold and silver mine, two-foot vein, paying $200 to $1,000 per ton, and in an opposite direction from that town are gold and silver and argentiferous galena mines, yielding from $100 to $400 per ton, with veins two to six feet in width.

Mineral Park is the center of a large number of mines in active operation. In the Keystone are ruby and native silver, iron and zinc, averaging $200 per ton in silver. The Lone Star has horn, ruby, and native silver, yielding $200 to $600 per ton. The Metallic Accident is a large lode of low-grade ore, with a number of high-grade feeders. On the southern side of Sherum Peak, the highest point of the Cerbat range, is another very large vein of low-grade ore. The Index is a twenty-inch vein a mile north-east of Mineral Park, that has ore yielding $286 per ton. The Laporte, in the same vicinity, assays $534. To the west and south-west of Mineral Park and near Sherum Peak are numerous large lodes of smelting ore, giving twenty to sixty per cent. lead and thirty to one hundred dollars silver.

Chloride Flat is six miles north of Mineral Park; its ores are mostly chlorides and large veins of argentiferous galena; two of the mines have gold, and in three the owners claim to have a good prospect for cinnabar. Chlorides and carbonates frequently change to rich sulphurets at the water line, forty to fifty feet from the surface.

Twenty-five miles east of Mineral Park is the Peacock range of mountains, and at the north end of the range, north-eastern slope, 1,400 feet above the valley, is located the Hackberry mine, (discovered October, 1874) with a vein of silver ore ten to eighteen inches thick in six or eight feet of brown quartz forming its foot-wall. The hanging wall is soft porphyry, with a thick stratum of white clay separating it from the vein. At fifty feet (water level) a baser ore is found, below which it must be roasted. Above it is free milling, which will work up to eighty per cent. At sixty-two feet the vein is solid, fourteen inches thick, and the ore averages $340 per ton in the five-stamp mill at the mine. Water and wood are abundant. East of the range is a country well supplied with wood, water, grass and game, explorations in which have but recently been commenced.

To the southward, in the district of Cedar valley, the Arnold lode has a large per centage of gold, and the silver ores from the Hibernia and other mines in that district contain a per centage of copper. The Wauba-Yuma district, close by the Maynard, appears to be among the "things that were, but are not," though not many years ago a granite mountain in which one of its mines was found was considered to possess characteristics common to the auriferous lodes of the Sierra Nevada, having the same north-east and south-west direction. Grass and water abound, and there is some timber. The Moss mine, in the San Francisco district, near Hardyville, was sold for a large sum to a Philadelphia company, who began at the wrong end, by building a mill and a village at heavy expense before prospecting the mine, and continued to do business on the same principle, so that the mine is now abandoned for want not of ore, but of skill and judgment, and the district is pretty much *non est.* There is near Hardyville a deposit of purple and white fluor spar.

The Burro mine and its extensions are on Burro creek, seven miles from the Big Sandy and eight miles from Greenwood. One of the extensions (1st south) has been bonded for $33,000. The vein crops out boldly for 600 feet; the vein matter is forty feet in width, is embedded in a formation of spar, and located for 6,000 feet, crosses the cañon of Burro creek, climbs the hill, and crops out at a boiling spring in another cañon. On Boulder creek, a tributary of Burro creek, twenty-eight miles from the mouth of the latter, is the Richmond mine, Mountain Spring Belt, with twenty-two inches of ore, six to eight of which assays from $200 to $1,700 per ton, but the mine is almost inaccessible. Somewhere in this region is Vinegar creek, a two-inch stream which is said to answer for vinegar. Perhaps somebody will find a molasses deposit up there before long!

And now comes, bringing up the rear of this description, but leading the van of the Mojave county mines, the McCracken, discovered by Jackson McCracken on August 17th, 1874. It is six miles north of Bill Williams creek, (a little to the south of which is the Planet copper mine, Yuma county) twelve miles from Greenwood on the Big Sandy, and thirty-five miles from the Colorado. The lode runs nearly due north and south near the top of a hill, the elevation of which is about two thousand feet above the adjacent valleys. For about two miles it is continuously traceable, and occasionally, by out-crops southwardly for fully ten miles. Its outcrop on the summit of the hill is visible for a considerable distance. The formation of the mine is a spar gangue, in a formation of granite, and, as an exception to a supposed uniform rule in regard to the matrix of gold and silver, it is worthy of attention from both a practical and scientific standpoint. The spar forming the out-croppings on the hill has a dark, burned appearance, resembling at a distance a black volcanic dyke; and having been so regarded by prospectors was passed by unnoticed. The McCracken company own two mining claims of fifteen hundred feet in length, named the Senator and the Alta. A great amount of work has been done on the mine, one of several shafts reaching a depth of nearly four hundred feet; over a thousand feet of the tunnels are in vein matter all the way. The best of the milling ore assays $96 per ton; the bullion produced is 985 fine. The second class assays $65. There are small stratas of carbonate ore containing $237 per ton silver, and twenty per cent. lead. The vein at the surface is in places over eighty feet in width. Adjacent to the discovery mines above mentioned are the Signal, (originally San Francisco) and the Palmetto. The product of all these mines is enormous, and may at present be roughly estimated at about $150,000 or $200,000 a month, though apparently limited only by their milling facilities. The ores of the McCracken have been crushed by a ten-stamp mill at Greenwood, but a twenty-stamp mill has just been completed at Virginia city, five miles below, and about nine miles from the mine, and in the same locality another mill is working on ores from the Signal.

Of course there was a rush after the discovery, and hundreds of locations were made in the vicinity, but quite a number off the lode proved to be of small account.

The vein out-crops again six miles south of the McCracken, and from mineralogical reports, made some years ago, it is not improbable that the region immediately north, as well as south of the Bill Williams river, will prove valuable for copper. The country in the vicinity, however, is dreary in the extreme; water for the use of the McCracken mine is brought from a distance of eight miles.

The discovery mines were worked at first by the "Alta Consolidated Company," and the "Senator Consolidated Company," both composed of the same persons; and the two consolidations consolidated some more into the McCracken Consolidated Company, which consolidation of consolidations will no doubt make solid work on a basis of solidarity, in dealing with the solidities of the mine, in which there are no fluidities, even at a depth of five hundred feet. And in view of the unqualified solidity and dryness of the subject, it is best to bring this chapter to a close by subjoining a tabulated statement of the mines in Mojave county, so far as obtainable. Up to October 1st, 1876, exclusive of old and abandoned locations, 2,000 mines had been located and recorded in Mojave county:

NAME OF MINE.	District or Placer.	Owned or Leased by.	Product per Ton.	Assays per Ton.	Remarks.
Alba Stevens	Maynard	Cory & Potts	$200		Stockton Hill; 8 to 20 in. vein.
Albany	Chloride Flat.		$200		Galena and silver; 2 to 8 feet smelting ore; 20 to 60 per cent. lead.
Alta (see McCracken)					
American Flag	Hualapais Mountain, 35 m. S. E. Mineral Park.	Shoulters	$300		Silver; Hualapais Mtns, 35 S. E. of Mineral Park.
Armagosa	Hualapais		$400		
Arnold's	Cedar Valley		$50 to $80		5 tons shipped S. F. at $312 per ton; gold and silver; tunnel 80 ft.; 3 shafts.
Black Snake	Hualapais, half way between Chloride and Mineral Park		$250		Chloride.
Blue Dick	Chloride Flat, 1 m. E. of Empire.	Winham & Reany.			
Burro	Greenwood	C. C. Wilson et al.		$100 to $500	20 ft. vein.
Burro Extension	Greenwood	C. C. Wilson et al.			10 to 15 ft. vein.
Burro, 1st Ext. South	Greenwood	Musick & Smith	$300	$17 to $90.	6 to 11 ft. wide; bonded to Parsons & Co. for $33,000; shaft and tunnel.
Cady	Hualapais	Towle & Co.	$30 to $60		1st extension N. of Quaker; silver; width of vein, 10 to 22 feet.
Carlotta	Goodwin				
Carlotta No. 2	Goodwin	Dr. Thibodo, locator.			
Centennial	Greenwood		$100		Ledge 80 feet wide.
Champion	Cerbat	CerbatMin'gCo.	$70		Left vein, gold, silver, and lead.

Clinton	Hualapais				
Courier	Chloride Flat	Canavan & Smith.	$400	$5,000	1 mile from Black Snake; chloride and carb., with gold.
Continental	Cerbat Mts			$100 to $1,000.	1 to 4 ft. vein; silver.
Cupel	Stockton	Cory & Potts.	$200		20 in. vein; native ruby and sulphuret silver.
Dandy	Hualapais				Shaft 50 feet.
Dean	Maynard				Gold and silver 8 ft. vein; bonded by Co., who paid owners $10,000 to work one year, then pay $100,000, or forfeit; 10-stamp mill.
Diana	Chloride Flat.	Rogers & Doniphan.	$300	$300 to $3,000	Chloride; 3 to 4 feet.
Dolly Varden	Stockton Hill.	Cory & Potts.	$200		Silver; 20 inch vein.
Ed. Everett	Stockton	Cory & Potts.	$200		Silver; 8 to 20 inch vein.
Empire	Chloride	Cerbat Mining Co.	$210 to $250.		Galena and silver; 2 to 20 ft. vein; smelting ore 20 to 60 p. c. lead.
Fairfield	Hualapais.		$90.		4 ft. vein; shaft 120 feet.
Fontenoy	Hualapais, 1 m. E. of Cerbat.	Canavan & Mulligan.	$142 to $530.		2 ft. vein; 5-stamp mill; 17 tons sold S. F., $500 per ton.
Franklin	Cerbat			$100 to $1,000	Silver; vein 1 to 4 foot wide.
Greenwood					Gold; mill.
Gunsight	Cedar Valley.		$500.		
Hackberry	Near Peacock Mtns.	Ridenour & Crozier.	$247.		50 shafts; 5-stamp mill.
Hackberry (South).	30 miles from Mineral Park.				
Hermit	Chloride.	Reany			1 m. E. of Empire; silver and lead.
Hibernia	Cedar Valley.			$100 to $1,000	
Hope	Cedar Valley.			$100 to $1,000	
Independence No. 1.	1 m. E of Chloride.			$50 to $500.	6 ft. vein; argentiferous galena.
Independence No. 2.	1 mile NE. of Chloride.			$480	3 ft. vein; argentiferous galena.
Index	1 mile NE. of Mineral Park.	Haas & Co.		$236	Silver; 20 inch vein; mill at Mineral Park.
I X L	Cerbat			$100 to $1,000	Silver; width vein 1 to 4 feet.
John Mass	Nr. Hardyville				

NAME OF MINE.	District or Placer.	Owned or Leased by	Product per Ton.	Assays per Ton.	Remarks.
Jones	Hualapais				
Keystone	Mineral Park	A Cal. company	$200		3 ft. vein; black sulphurets, native and ruby silver.
Keystone (claim next west of)	Mineral Park	Wm. H. Hardy & Co.			
La Porte	1 m. NE. of Mineral Park.	Davison & Co.	$250	$534	
Legal Tender	Cerbat			$1,000–$10,000	Silver; 1 to 4 ft. vein.
Little Chief	Cerbat			$100 to $1,000	Silver; 1 to 4 ft. vein.
Little Tiger	Stockton	Cory & Potts	$200		Silver; native ruby and sulphurets; 8 to 20 inch vein.
Lone Star	1 m. NE. of Mineral Park.	An Arizona company.	$200 to $600		Native silver and black sulphurets; deep shaft.
Lobena	Cerbat			$100 to $1,000	Silver; 1 to 4 ft. vein.
Magendie	Cedar Valley				Pay-rock 4 feet; shaft 150 feet; tunnel, 40 ft.
May Flower	Hualapais				
McCracken	Owen District.	Incorp. Comp'y	$64	$96	Gold; two mines—Senate and Alta; extensive shafts and tunnels; 50 stamp mill; 12 miles E.
Metallic Accident	Mineral Park		$300 to $1,000.		
Mineral Park					5 stamp mill.
Mocking Bird	Hualapais, 2 or 3 m. fm Cerbat	Riley & Co.	$700	$1,000	2 ft. vein; gray and blue sulph. silver; shaft and two tunnels.
Monitor	Cerbat.			$100 to $1,000.	Silver vein 1 to 4 feet wide.
Moss Gold	15 m. E. of Camp Mojave.				Not now worked.
New Era	Cerbat		$1,000 selected		Disc. in 1863.
New York	Hualapais, near Cerbat.	Mulligan.			Silver $100 to $600 per ton.
Niles	Hualapais				
O'Fallon	Cerbat, 4 m. S. of C.	Johnson & Co.			Gold and silver; 2 ft. vein; ore shipped S. F.; yielded $300 per ton.
Oriental	Chloride	E. Martin Smith	$100 to $300		5 to 20 ft. vein; arg. galena and carb.; S. of Independence No. 1.

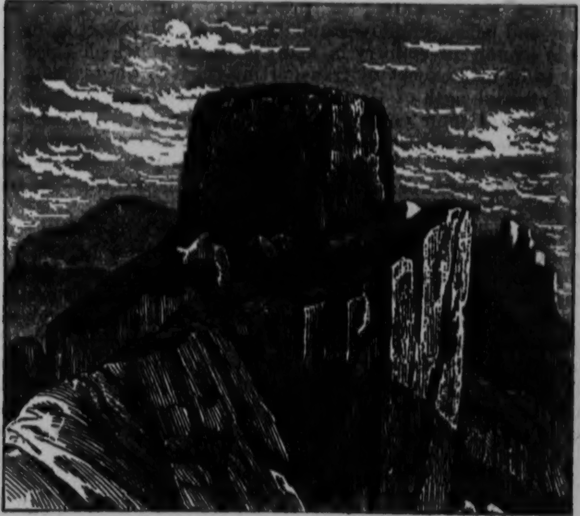
Oro Plata	Cerbat	Cody & Layne.	$200 to $1,000		Gold and silver; worked some years.
Paymaster	Cerbat.				3 foot vein; shaft.
Pennsylvania.	2 m. W. of Chloride.	O. Groom	$200	$1,000	4 ft. vein; chloride, changing to sulphuret at 40 feet.
Pink Eye	Chloride, ½ m. E. of Penn.	J. Barnes & Co.	$300	$900 to $3,000	Chloride; 2 to 4 ft. vein.
Planet Copper	12 m. E. Aubrey				25 to 60 p. c. copper; rich in silver.
Planet Mine	Planet M'g Co.	William Fisk			High grade copper; 20 men in 1873.
Porter	Bet. Chl'de and Mineral Park.		$300		Chlorides and carbonates, changing at 50 ft. to sulphurets.
Rainbow	Cedar Valley				Shaft.
Richmond	Boulder Creek.			$200 to $1,700	22 in. ore; on Mtn. Spring belt.
Rose Bud	Bet. Chl'de and Mineral Park.		$300		Chlorides, carbonates, and (at 50 ft.) sulphurets; arrastras.
Quaker	Chloride		$30 to $60.		Sulph., carb., and arg. galena silver; width vein, 10 to 22 ft.
San Fran. (see Signal)					
Schenectady	Chloride Flat		$50 to $[illegible]00.		Galena and silver; smelting ores 20 to 60 p. c. lead; 2 to 4 ft. vein; Baker furnace.
Schuylkill	Chloride Flat		$45 silver		Baker furnace.
Senator	Owen				One of the McCracken mines.
Senator	Chloride Flat	Ashton			Silver and lead.
Sherum Peak	4 m. N.E. of Mineral Park.	Mix & Co			Very large vein of low-grade ore.
Shoulters	Maynard Dist				
Signal (formerly San Francisco).	Owen	Incorporated	$85 to $100.		Western extension of McCracken; 10-stamp mill 9 miles.
Silver Glance	Owen				Argentiferous galena, etc.
Silver Hill	Chloride Flat		$200		Silver; 4 foot vein.
Sixty-two	Near Stockton.				Ore shipped to San Francisco.
Sixty-three	Hualapais, 2 m. NE. of Cerbat		$200		3 ft. vein; 50 tons sold S. F. at $600 a ton.
Snow Flake	Cerbat Mts		$200.	$100 to $1,000	1 to 4 ft. vein silver.
Sunday-School	Chloride	W. H. Raymond	$80 to $500.		400 yards W. of Empire Mine.
Tiger	Hualapais			$100 to $1,000	Silver; vein 1 to 4 feet wide.
Twins	Cerbat	Cerbat Min. Co.	$100 to $400		Gold and silver.
Vanderbilt	Cerbat	Cerbat Min. Co.	$20 to $1,000.		2 foot vein; gold and silver.
Virginia	Chloride	H. Ashton		$100 to $1,000	2 ft. vein; gray chloride and sulph.

CHAPTER VI.

OVER VALLEY AND MESA.

Leaving Yuma. A Picture to be Remembered. Up the Gila. Old Placers. Coronacion Mountain. Antelope. Oatman Flats. The Painted Rocks. Montezuma's Head. The Valley and its Agricultural Capacity. Pima Village. Florence. El Picacho. Tucson. The Landscape. Mirage on the Desert.

From the sandy street of quaint and queer-looking Yuma, the traveller, on business or pleasure intent, will, if bound for "the outside,"—a genuine Arizona pioneer always speaks of going "inside" if he is about to visit California; so *per contra* the opposite phrase must be appropriate for a journey into the interior of this "marvellous country"—a traveller so bound will find himself, if he knows what is wise, on the outside of, and alongside the Jehu who may drive the particular Concord coach which is to have the honor of receiving him on the day of departure. A glance at the scene may not be without pleasure. It forms a picture not easily erased from memory, if the observer be at all alive to the mingling humor, grotesqueness and beauty that blend in the quaintness of this out-o'-doors. A great wide stretch of avenue, lined for a quarter of a mile by straggling adobes—a material that always carries a dilapidated look with it, but a few of which have lost their usual gray ashen hue under a coating of whitewash. Looking eastward one sees the green line of willowy trees and bushes, that bend over and fringe the great river. Across its waters the eye rests upon the uncouth group of buildings there perched upon the sand-dune that has for so many years borne aloft "Old Glory," and told to the weary traveller of "mine Uncle's" care and guardianship. The setting makes the gem, for sure it is that Fort Yuma is no jewel. The wide horizon's stretch, the strange peaks that almost quiver in the morning haze, the far-off "Purple Hills," the wavy line of odd-shaped mesa and bluff, which can be traced by the eye; these for our western perspective unite to make a rare picture of strange tones, colors, and atmospheric effects. A long line of floating smoke, low-lying and moving with the faint pulsations from iron lungs that faintly float in and mingle with the clear air, tells of where the laboring locomotive pants and strives in the work to which it has been set, of making the desert "rejoice and blossom as the rose." Wild as are the chief accessories, there is a strange sense of eld in it all. To the eastern prospective the observer turns eagerly, only to note the marvelous clearness of the sky, the mystic foreshortening effect which it produces bringing almost, it would seem, to the waiting hand the serrated summits and jagged outlines of far-off peaks and ranges. The colors round about are brown and gray; above, the arching ether is of deep, intense blue, translucent through all its marvelous sweep and majestic depths. The mesa hems in on either side the straggling, uncouth street. To the north one may almost detect the bold outlines of Castle Dome. The stragglers are scanning the coach and its passengers. The postmaster hastens to put the mail aboard; the lazy Indian, in his



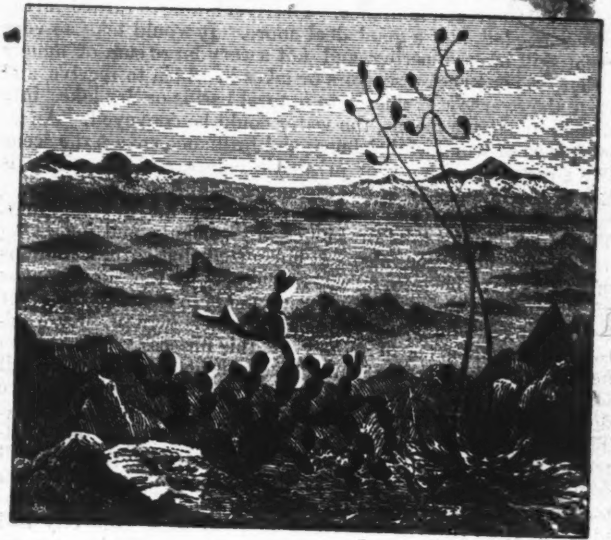
CASTLE DOME.

breech-clout or ragged pants; the more picturesque Mexican; and the cynical, careless, stalwart American, stand round to watch the driver mount and the coach roll out. This is the yard or corral of Kerens & Mitchell, the proprietors of the Southern Pacific overland stages, and mail contractors on this and other routes. The force of men and animals employed in stocking and running such an enterprise is very much larger than one unacquainted with the business can imagine; for it involves not only the providing of coaches, animals to draw them, and men to drive and care for these, but the locating of stations, the providing of provender, water, food, for both man and beast, employer and traveller, and that, too, over a wide stretch of country in many portions of which these are not to be had, except by transporting them to the place of use. The entire length of the Southern Overland Stage Company's routes, and their connections, will aggregate nearly or quite two thousand miles. At present the region traversed is very sparsely settled. The worst danger of the past—the marauding Apache—has ceased; and the one of the future—the road agents and their depredations—has not yet arrived.

The coach rolls out and the traveler is fairly launched. He doubtless secures an inside seat, but if he is wise he will ride with the driver. Old hands at the business always make a point of this. Some good tobacco, a stray cigar, and perhaps a little pull at a convenient flask, will make Jehu pleasant and talkative. The overland drivers are *sui generis*—a class by themselves. Arizona has its characters, and not the least notable are found among stage-drivers. Men of nerve, sobriety, and intelligence, as a rule, they fully deserve the confidence accorded. Most of them would be cool even if they were not

"Out of the gates of death,
Out of the jaws of hell."

Their histories are peculiar; their language also; their ways are usually quiet, and from their ranks have come men of mark. If the top of the vehicle is not heavily loaded, and is guarded by a rail, the traveler will do well to put a preëmption thereon as a sleeping-place. Of course he has provided himself with a large canteen, holding a gallon at least; and with his blankets, a good driver, and a fair day, it will go hard if he does not make himself as comfortable as the circumstances will allow. If an inside seat is secured, let it be one at the back, and next the side. A good precaution is to carry a stout strap, which can be passed round the coach door and the body, so that when sleeping the jolting of the vehicle will be thus prevented from throwing the passenger out of his seat. Of one thing heed must be taken. In no place is the spirit of courtesy and mutual accommodation more needed than in a crowded stage-coach starting out on a long journey. Rolling day and night over gravelly mesa, sandy river road, and stony mountain pass, there will be ample room for the exercise of all the finer courtesies and social amenities. The aspect of much of the scenery along this gray valley road, bleak, rocky mesa track, lined on either side by volcanic ranges of jagged peaks and serrated slopes, so brown and sere, and with not a growing thing to relieve the barrenness of their sides, is not of a character to be desired for a steady landscape. But it has its own beauty—rare, because it is so different from what one sees elsewhere—and possessing charms that are all its own, unique and captivating. The graceful mesquite and malverde trees grow everywhere, and the numberless varieties of the cactus make the scene still stranger to an unaccustomed vision.

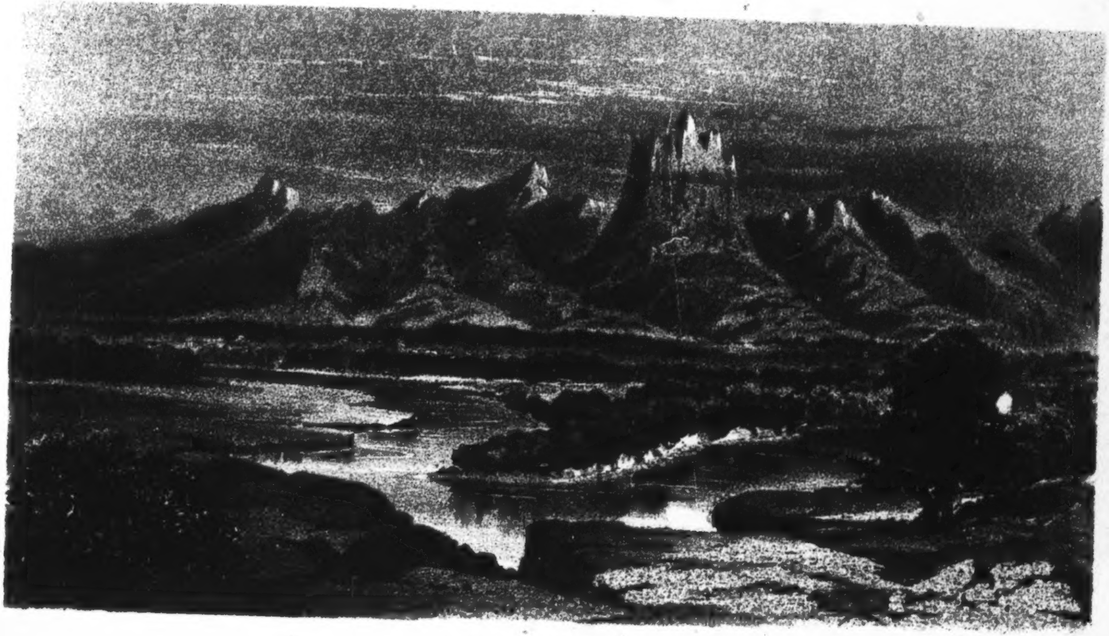


THE MIRAGE.

The first stage out is to Gila city. This now consists of a comfortable stage station, a broad expanse of tillable valley land, sometimes overflowed by the river, which is at times "mighty uncertain," and a steep range of volcanic hills coming close to the highways—is for a dozen miles or so hot, heavy and sandy. It is hardly fair to say sandy, as it is really a friable alluvial loam, of grayish hue and loose texture. Several ranches are passed, showing that the Gila bottom is cultivable. With irrigation every square mile of the Gila valley is capable of producing prolific crops of grains and semi-tropical fruits, as well as cotton and sugar in great abundance. The river is able to furnish all the water needed, and a good deal more. It would take no very great skill in engineering, and not a very large sum of money either, to construct reservoirs or lakes in which to receive and store the overflow. There are natural basins or dry lakes into which, by simple means, the water could be conveyed. An atmosphere of wonderful richness and brilliance covers the scene like a gorgeous canopy of prismatic colors, and the vision is lost in the immensity of the distances.

Gila city was at one time a great place for dry diggings. The mountainous hills or ranges are volcanic, and for a long distance are auriferous also. It is asserted that several millions of dollars have been taken out in the past by the slow process of digging out the gravel and carrying it in sacks to the river for washing. The Yuma Indians and others earn in their desultory way small sums of money by this process. The station keeper, a clever German named Lang, is accumulating a small fortune by trading with them, and buying their gold at twelve dollars per ounce, the market rate being about nineteen, I believe. The placers are very extensive, and the prospects are quite flattering that a recent incorporation formed for the purpose will command the capital necessary to construct flumes and other means of working the "Tom Tiddler's ground" that now lies idle. J. Ross Browne described in 1863 what Gila city had been, and the words will answer for to-day, with the neat station and thriving ranch thrown in as additional accessories:

"We camped at Gila city, a very pretty place, encircled in the rear by volcanic hills and mountains, and pleasantly overlooking the bend of the river, with its sand-flats, arrow-weeds, and cotton-woods in front. Gold was found in the adjacent hills a few years ago, and a grand furor for the "placers of the Gila" raged throughout the territory. At one time over a thousand hardy adventurers were prospecting the gulches and cañons in this vicinity. The earth was turned inside out. Ru-



LITH. BRITTON, REY & CO. S.F.

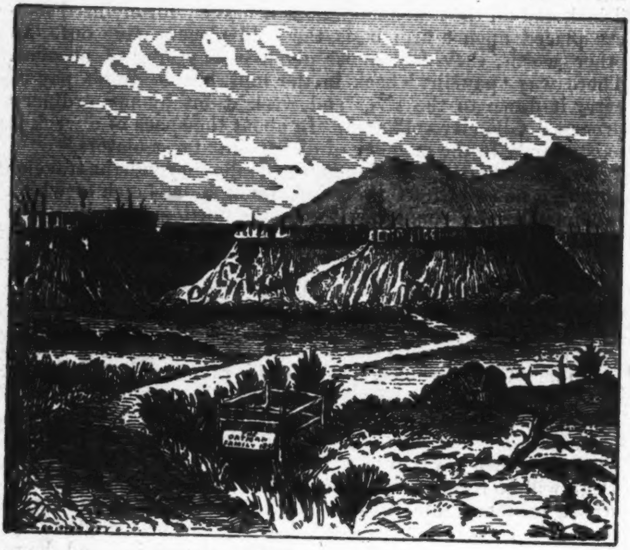
CORONNACION PEAK

mors of extraordinary discoveries flew on the wings of the wind in every direction. Enterprising men hurried to the spot with barrels of whisky and billiard-tables; Jews came with ready-made clothing and fancy wares; traders crowded in with wagon-loads of pork and beans; and gamblers came with cards and monte-tables. There was every thing in Gila city within a few months but a church and a jail, which were accounted barbarisms by the mass of the population. When the city was built, bar-rooms and billiard-saloons opened, monte-tables established, and all the accommodations necessary for civilized society placed upon a firm basis, the gold placers gave out. In other words, they had never given in anything of account. There was 'pay-dirt' back in the hills, but it didn't pay to carry it down to the river and wash it out by any ordinary process. Gila city collapsed. In about the space of a week it existed only in the memory of disappointed speculators."

At Mission camp, a station fourteen miles beyond, the traveler obtains a fine view of Coronacion mountain, a sketch of which accompanies this chapter. It is on the north side of the river about ten miles from the station. The afternoon shadows will have begun to fall, and the purple hues which are their characteristics lie on the side of the magnificent range whose weird summit has assumed such a remarkable shape. The old Spanish explorers named it the "Coronacion," from a fancied resemblance to a mitred crown. G. D. Bartlett, United States Boundary Commissioner, speaks of this range as the "Pagoda," but the Spanish name seems to suit best the mountain summit, gilded as it is by the sun's glow, while the great deep sides wear the imperial purple hues that clothe them as if indeed they formed a royal robe. Fifteen miles beyond, Antelope Peak will be reached. It is a singular mass of volcanic rock, whose northern side rises bold and almost sheer to its jagged top, while therefrom it descends in a series of broken bluffs. A good ranch on the river bottom supplies the station, and shows that with industry and water the seeming desert is amazingly fertile. If as is usual the weather is clear, the afternoon ride when out of midsummer will prove delightful — "soft, balmy sunshine in the afternoon; clear and frosty at night; and atmospheric tints morning and evening that would enchant an artist, and set a poet to rhyming."

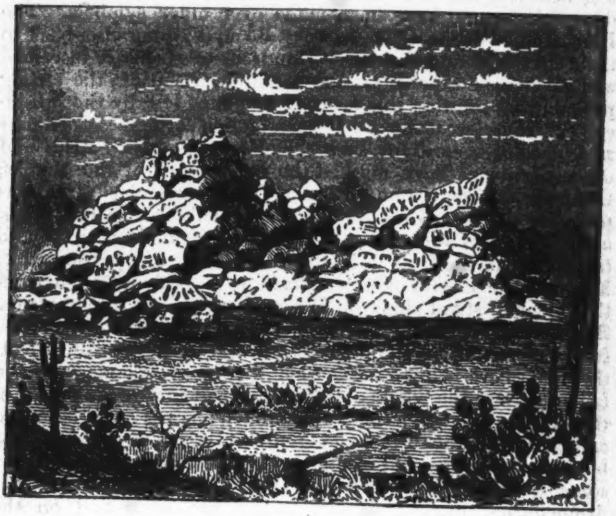
The road has no special attraction until the Agua Caliente, or Hot Springs, are reached. The ranch near by is owned by a famous Arizonian, King Woolsey, whose history as pioneer, fighter, and citizen is quite remarkable. An abundant supply of water flows from these springs. They lie near the point of a hill, about a mile and a half from the ranch. The water is of an exquisite temperature, and possesses some very remarkable qualities in softening the skin and soothing the nervous system.

One of the historic places of Arizona is next passed—Oatman's Flat—so called because of the terrible tragedy which occurred there in 1851, resulting in the death at the hands of the Apaches of Mr. Royse Oatman, of Texas, with his wife and four children. Two young girls were carried off. A boy, Lorenzo, was struck down and left for dead. He afterwards recovered; and Olive, one of his captured sisters, after four years of horrible captivity among the Apaches and Mojaves, was released and restored to her brother. Both were living in New York State a few years since, and are there now, in all probability. The lonely grave is in keeping with the scene of the tragedy. A curious mesa formation can be seen on the right. A dark bluff resembling a colossal tower forms the termination



OATMAN'S FLAT AND GRAVE.

of the mesa. Upon its summit stands, like some huge sentinel, a solitary cactus, of the giant class, while the vertical depth to the valley is about two hundred feet. A mile beyond the tower the lower extremity of the valley or flat, through which the road runs, is abruptly walled in by nearly a similar embankment of natural fortifications, presenting apparently no place of exit. Upon a close inspection, however, a thin yellowish vein is seen winding up the brow of the precipice. This is the road to Yuma; and the summit of the mesa is the scene of a tragedy which is still told with "bated breath" in the adobes of the territory. The opposite side of the river presents a perpendicular wall of rocks. The mesa over which the coach grinds its way is covered with round, smooth stones, apparently burned and glazed by fire. As far as sight can reach, the face of the country seems to be a continued sea of dark glazed stones, bounded only in the distance by rugged mountains.



PAINTED ROCKS.

A few miles beyond Oatman's Flat and near the road, the coach will stop a few minutes to enable the travelers to get out and view the famous "Pedras Pintados," or painted rocks. They stand out entirely alone in a gravelly plain, a singular pile of huge boulders heaped up to the height of some forty or fifty feet. It does not seem possible for human agency to have brought them here, and yet their singular isolation and character almost induces a belief that they are an artificially raised pile. The smooth sides of these boulders are covered with rude carvings—grotesque hieroglyphics. Some of them are painted over, and none appear to be of very great antiquity. Mr. Bartlett believed that many of them are very old. There is evidence that some have been made over older symbols. The Pima Indians date them, as they do everything else, back to their mythical montezumas. Hundreds of them are inscribed and carved. So far as tradition will bear sifting, the strong probabilities are that this mass of boulders, left by the subsidence of some great flood, has been chosen for generations past as a place of record for such tribal engagements, battles and other events as have marked the contentions of the Yumas, Cocopahs, Maricopas and Pimas. This particular place was probably the scene of some fight or council great in Indian annals. Some of the carvings are amusing, aiming as they do to express all the facts of human life, fighting and passion alike. Many of the largest boulders have, it is evident, fallen from the pile, and stand alone on the arid mesa. A recent writer thus describes this notable curiosity: "This mass of rock rises from the surface of the plain to a height of perhaps fifty feet, the uppermost being a broken ledge, from which masses have fallen off, and the whole covering less than an acre of land. On the standing ledge, and on the broken masses at its base, are carved deep in the surface rude representations of men, animals, birds, and reptiles, and of numerous objects real or imaginary, some of which represent checker-boards, some camels and dromedaries, insects, snakes, turtles, etc., etc.; and on the broken rocks at the base of the ledge are found on all sides like sculptured figures, some of which are deeply imbedded in the sand."*

The route from this point, either by the river bend or across the forty mile desert, possesses no special attraction. At Maricopa Wells the passenger will find a nice station, store and ranch, kept by Captain Moore, one of the best esteemed and most genial citizens of Arizona. Just beyond, at the southern spur of the Estrella range, may be seen a remarkable formation, presenting clearly and distinctly the face of a man reclining, with his eyes closed as though in sleep. Mrs. Clifford, in her pretty volume of "Overland Tales," gives the traditionary lore, and a bright word painting, which is reproduced: "Among the most beautiful of all the legends told here, is that concerning this face. It is Montezuma's face, so the Indians believe, (even those in Mexico, who have never seen the image) and he will awaken from his long sleep some day, will gather all the brave and the faithful around him, raise and uplift his downtrodden people, and restore to his kingdom the old power and the old glory—as it was before the Hidalgos invaded it. So strong is this belief in some parts of Mexico, that people who passed through that country years ago tell me of some localities where fires were kept constantly burning, in anticipation of Montezuma's early coming. It looks as though the stern face up there was just a little softened in its expression by the deep slumber that holds the eyelids over the commanding eye; and all nature seems hushed into death-like stillness. Day after day, year after year, century after century, slumbers the man up there on the height, and life and vegetation sleep on the arid plains below—a slumber never disturbed—a sleep never broken—for the battle-cry of Yuma, Pima, and Maricopa that once rang at the foot of the mountain did not reach Montezuma's ear; and the dying shrieks of the children of those who came far over the seas to rob him of his scepter and crown fall unheeded on the rocks and the deserts that guard his sleep."

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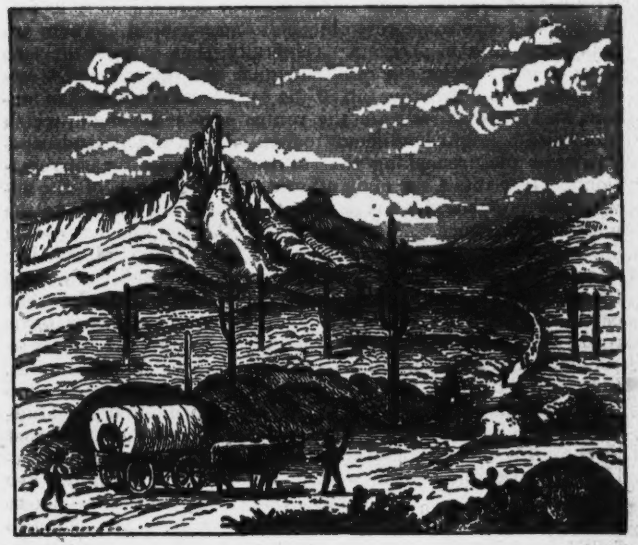
*Hodges' "Arizona as It Is."

On the third day's staging, and after passing Maricopa Wells, the traveler gets a glimpse of the famous Casa Grande ruins. Very little is now left standing of what two centuries since the first Spanish explorers saw. Casa Grande is about a mile from the main line of travel. In going to it the eye can easily trace the mounds which mark the place of former habitations, the long lines of broken and disused irrigating works, also fragments of broken pottery, etc. Those who have explored the mesa for miles in different directions state that on every side the evidence is abundant of the fact that a large city once existed there. It is a strange, massive piece of ruins, now only from two to three stories in height, and covering only a small area. The walls are of concrete, and very thick, about four feet in the parts explored. The inner walls are quite hard-finished and smooth, having been apparently covered with some sort of cement. The rooms, so far as they can be traced, are small, and the apertures for light and passage are narrow, and would really appear to have been arranged for defense. Time admits on a stage journey of only a hasty glance. It will be described elsewhere in this volume, with the speculations and theories that gather about it. Standing in the midst of a wide stretch of arid plain, mountains faint and black in the distance, gray-white in color, heaps of ashen-looking debris all about, are remarkable evidences of a strange antiquity, of the character of which there remains but little knowledge. Across the Indian Reservation, over a valley which has been cultivated for four centuries by these same people, the journey grows less monotonous. Arriving within a few miles of Florence the traveler begins to see signs of a more advanced civilization in the shape of cultivated land, rich, waving crops of barley, wheat, and other cereals, groves of cottonwood lining the road, fields, and river banks; while fruit-trees, gardens, etc., greet the eye and gladden the heart. Florence is a thriving town, located on the north bank of the Gila river, 237 miles east from Yuma, and is the initial point for some of the most important mining districts of central and southern Arizona. It is noticed in another chapter. Here the Gila is at its best. The river has but few confluents. The principal ones are the Salt river and San Pedro river. Two other small streams, the San Carlos and the San Francisco, on the upper Gila, help to feed the main river. Some of the territorial officials and persons who have traveled extensively, declare that the Gila divides into three branches—the San Pedro, the Domingo, and the upper Gila itself. Salt river is not seen from the stage route, which passes across the Gila bend about twenty-five or thirty miles south of the junction. The San Pedro comes in at about forty miles east of Florence, where the road leaves the river for Tucson, south by east. Both valleys are from five to ten miles wide, and the rivers are from 100 to 150 miles long. Salt river runs for a while almost north, and then bends almost due west. The San Pedro takes its rise in Sonora, near the line, and then flows almost due north into the Gila, at the point already named. The other chief stream is the one on which Tucson is located, the Santa Cruz river. It is called river in courtesy, but at present it hardly has the width and volume of a respectable Eastern or Middle States creek. Still, there is water enough to irrigate a small valley, some small portion of which has been under cultivation for over a hundred and fifty years. A ride of sixty miles from Florence, over a hard, gravelly, desert road, by the rugged Picacho del Tucson, makes a one day's or night's work for the traveler. If the latter time is used, the ride may be pleasure. Deliciously cool, the black masses of distant clouds throw great giantesque shadows and bars of light and darkness over plain and mountain, until, as the sun sets slowly and ruddily in the crimson west, the whole scene becomes one of enchantment. Arizona mesas are arid and barren—broad plateaux of wild, rugged, waterless deserts; the marvelous mountains are rugged, ragged, rough, red, and



PICACHO.

rude—barren to summit and bleak to every sense. The shadeless mesquite is not essentially handsome or inviting; the val-de-verde tree, with its mockery of leafless branches, is not an object of delight; the clouds of hot alkali dust that arise are not agreeable to eye or taste; the crunching of the rattling stage wheels over the gravelly and stony plain is not a pleasant sound to one's ears; the numerous varieties of the grotesque cactus, from the little cotton-like bulb of the smallest that hugs the earth, to the monstrous columnar fungus that outlines itself against the sky, are not especially inviting specimens of the freaks in which dame Nature occasionally indulges. Yet, and yet, the wonderful atmosphere that bends above and embraces us, is the most marvelous of magicians.

The Picacho, which forms the most prominent object on this portion of the road, lies forty-five miles from the Gila, and is about the same distance from Tucson. It presents a prominent and picturesque landmark from both points, and is seen at a great distance. The name is Spanish, and signifies "point," or "peak." Some travelers have discovered in this curious formation of rocks some resemblance to an axe-head. There are many Picachos in Arizona. Generally they consist of two sharp-pointed rocks, one of a triangular and the other of a rectangular shape, growing out of the top of some isolated mountain, and serve to indicate the routes across the mesa, which otherwise it might be difficult to find. It was not all landscape-gazing or picture-making that afforded theories for conversation. The Santa Cruz plain affords some evidence of the advance of population, though it is an unpromising field—to the unpracticed glance. A few miles from Tucson one may obtain a drink of as fresh, sweet milk as ever passed human lips. The dairy is excellently kept in the cool adobe building devoted thereto. Grass is abundant, and water can be found so that cattle may thrive. Wells are not difficult to sink, as water is readily obtainable from the sink of the Santa Cruz. And so one enters on Tucson, after a journey of three hundred miles. It is not an inviting place, and yet the site commands admiration. Turning to the south, one catches the finely defined outlines of the Santa Ritas. They close in the southern and east lines of this massive landscape. Following the horizon therefrom and turning to the west and northward again, the eye takes in a very bold and rugged range, marked on the latest map as the Atacoso mountains, but known here as the Tubac range, from the fact that the old pueblo of Tubac and the famous Mission of Tumacacori are located on its eastern base. There is a broad interval, and then further to the west can be seen, looming dim and purple against the evening sky, the jagged peaks of an irregular mountain formation known as the "Picacho del Alamo Muerto." Across a broad space, along the outer edge of which are misty outlines of another and unnamed range, the eye comes delightedly back to the neighborhood of Tucson, and gazes with pleasure on the well-marked if less elevated range close by, and the lesser peaks of which stand guard close to the town, known by the name of the town itself. Imagine, if you can, this bold, sweeping landscape of mountain and plain, in the foreground of which crowds near to the earth the little adobe city whose gray, ashen uncomeliness is relieved and enlightened by a small rim or setting, running for some distance along the narrow valley, of exquisitely green fields and trees, and then illuminate the sky that arches over it with all the wondrous hues of Arizona's amazing sunsets—great bars of blazing gold, glowing and crimson royal, deep-tinted purples lie athwart a background of translucent blue, melting toward the horizon line into hues of pearl, pink and faint aqua-marine, until at last it all passes away in the warm blue gray of these superb nights, and the golden stars come out to bespangle the heavens and inspire the imagination with awe at their nearness and beauteous harmony.

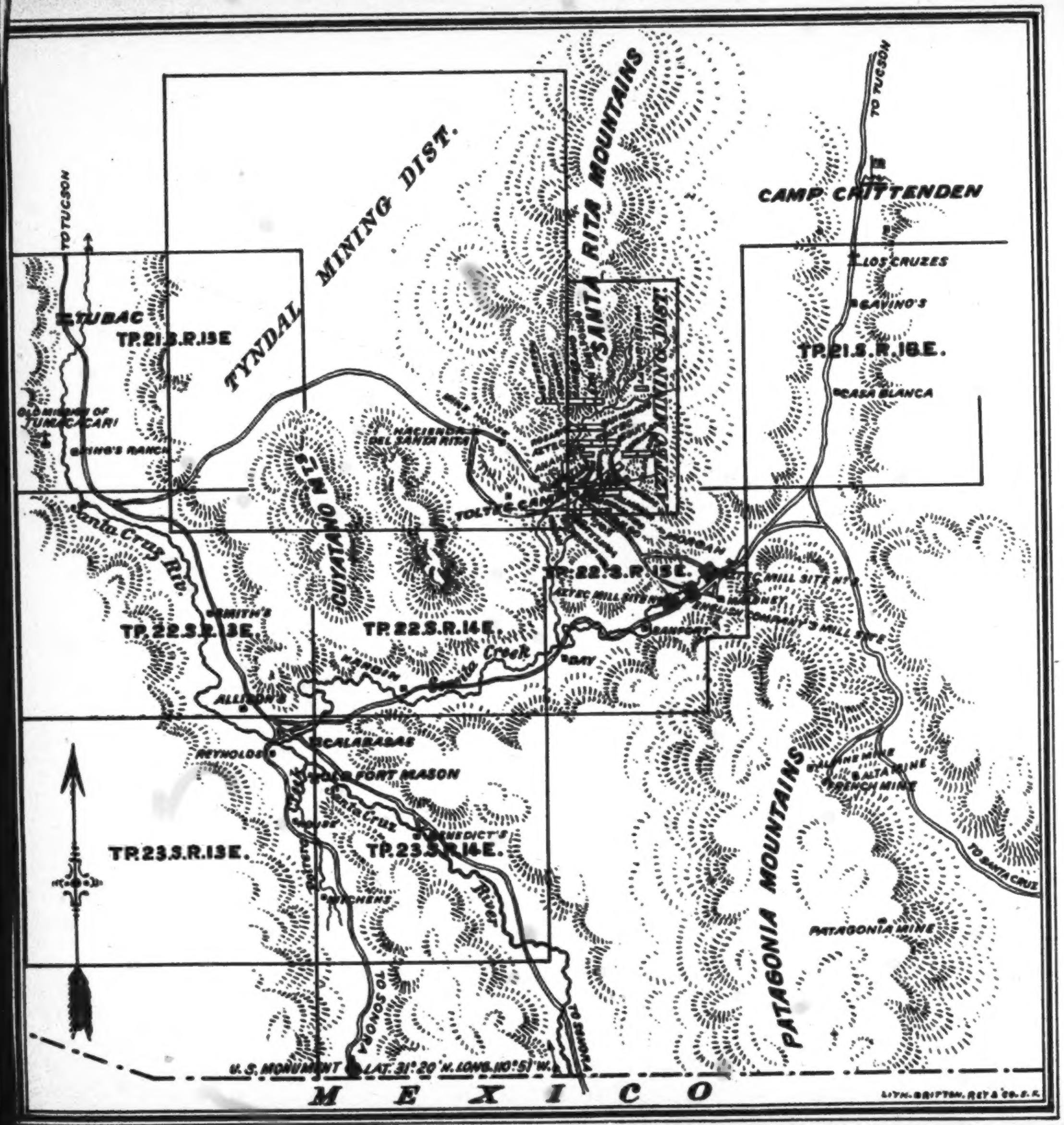
Among the notable experiences which our traveler is sure to realize on this journey is that of the moving mirage. It cannot be better described than by the words of J. Ross Browne, and with it this chapter will fitly close: "An isolated mountain in the distance seemed at the first view to rise abruptly out of a lake of silver, the shores of which were alive with water-fowl of brilliant and beautiful plumage. As we journeyed toward it the lake disappeared and the mountain changed to a frowning fortress, symmetrical in all its parts—a perfect model of architectural beauty. Still nearing it, the ramparts and embattlements melted into a dreamy haze, out of which gradually emerged a magnificent palace with pillars, and cornices, and archways, and a great dome, from which arose a staff, surmounted by a glowing blue ball, encircled by a halo. At the same time another mountain on the right, distant many miles, assumed equally strange and fantastic shapes; and when the ball arose upon our palace, another ball answered the signal from the distant mountain on the right; and then a great railway opened up between them, supported by innumerable piles, stretching many leagues over the desert. So perfect was the illusion that we stopped in breathless wonder, almost expecting to see a train of cars whirl along and vanish in the warm glow of the horizon."

CHAPTER VII.

THE UPPER SANTA CRUZ VALLEY.

THE SIERRA SANTA RITA. A GRAND MOUNTAIN RANGE. SENTINEL PEAK AND MOUNT WRIGHTSON FROM TUBAC. THE OLD AND THE NEW CIVILIZATION. AN OLD PRESIDIO AND ITS HISTORY. BOLD AND ROMANTIC SCENERY. MINERAL WEALTH. THE OLD MISSION AT TUMACACORI. JESUIT PADRES. LOST MINES REFOUND. PLANCHA DE PLATAS. AZTEC, SPANIARD, APACHE AND AMERICAN. OPINIONS OF SAVANTS ON ITS MINERAL WEALTH. THE CERRO COLORADO. THE SONOITA VALLEY. MILL SITES. HACIENDA DEL SANTA RITA AND TYNDALL DISTRICT. TOLTEC CAMP AND THE AZTEC DISTRICT. REPORT OF PROF. DAVIS. GEOLOGY AND MINERALOGY. EVIDENCE OF EXPERTS. PLACER MINES. EAST SIDE OF RANGE. ROADS, TIMBER, GRASS, CLIMATE. THE MIDNIGHT GLORY.

The upper valley of the Santa Cruz debouches south-easterly from its north-by-west course, leaving the remarkable evidence of catholic power and devotion manifested in the mission church of San Xavier del Bac, at the Papago Reservation. Crossing the eastern edge of the Prima Mining District, the traveler enters on a region of well grassed land, broad and rolling, in which the mountain ranges east and west are still misty in the distance. A shallow stream, fringed with heavy cotton wood and sycamore trees, meanders through a wide intervale which rises almost unnoted into a rugged *mesa*. To the west the outlines of the Picacho del Alama Muerto rise boldly. To the south and east a score of miles away may be traced the serrated lines of the Santa Rita, a mountain range of singular beauty, which grows grandly on one's approaching the ancient town of Tubac. The landscape is a bold one ; the gray and hazy outlines of rugged ranges becoming distinct, as they are approached. The effect of the atmospheric foreshortening is very peculiar. The valley offers advantageous places for camping. Starting early from Tucson, the first day's noon will generally find a traveler at one of the sinks of the Santa Cruz, where the water disappears in a shallow bed of gravel and quicksand. The stream has here a fall of 75 feet to the


TYNDAL MINING DIST.
SANTA RITA MOUNTAINS
AZTEC MINING DIST.
CAMP CRITTENDEN
TO TUCSON
LOS CRUZES
GAVINO'S
TP. 21. S. R. 16 E.
CASA BLANCA
TO TUCSON
TUBAC
TP. 21. S. R. 13 E.
OLD MISSION OF TUMACACARI
OTERO'S RANCH
HACIENDA DEL SANTA RITA
MINE HOUSE
TOLTEC CAMP
CUYATANO MTS
Santa Cruz Riv.
SMITH'S
TP. 22. S. R. 13 E.
TP. 22. S. R. 14 E.
TP. 22. S. R. 15 E.
MORGAN
AZTEC MILL SITE No. 1
AZTEC MILL SITE No. 2
MAHONEY
ENGLISH COMPANY'S MILL SITE
DAVENPORT
DAY
HARDIN
Sonoita Creek
ALLISON'S
CALABASAS
REYNOLDS
FORT MASON
Santa Cruz
BENEDICT'S
River
TP. 23. S. R. 13 E.
TP. 23. S. R. 14 E.
KITCHENS
TO SONORA
TO SONORA
SALERO MINE
ALTA MINE
FRENCH MINE
TO SANTA CRUZ
PATAGONIA MOUNTAINS
PATAGONIA MINE
U. S. MONUMENT LAT. 31° 20' N. LONG. 110° 51' W.
MEXICO
LITH. BRITTON, REY & CO. S. F.

TOWNSHIP MAP of the SANTA RITA Including the AZTEC & TYNDALL Mining Districts

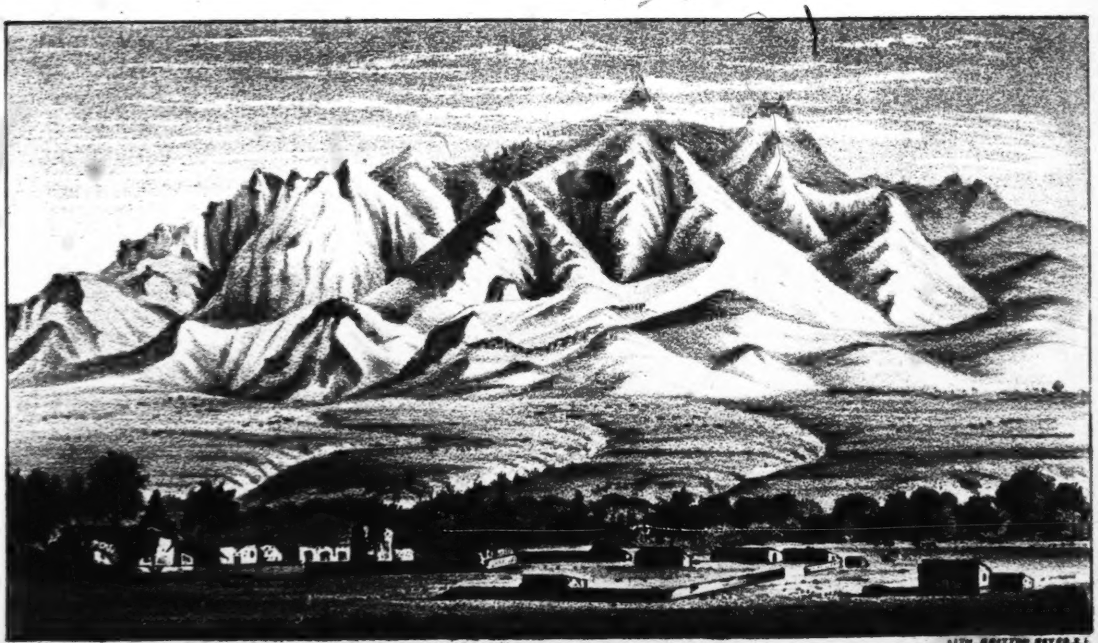
mile, and there is abundance of grass for feed. Near by is a Mexican cattle ranch. The great peaks of the Sierra Santa Rita now loom grandly before one through the trees. The mist is flushed with gold, and the warm purple tints are enchanting. Deep fissures can be traced, while the heavy cumuli, sun-flushed and crimson-barred, drift slowly athwart the blue sky. The course of the stream is nearly due south until the old mission ruins of Tumacacori are passed, and one would hardly imagine in the lonely beauty everywhere visible, that it had been not only the scene of busy life, but of death also, resounding with the harrowing yells of the bloody-minded Apache. But so it is: almost every foot of the road and valley is replete with tragic interest. Abundant proofs are seen on every hand of former settlement. The presence of the prospector and miner, come to stay, is already giving proofs of reassuring ability, in the shape of new ranches located and old ones reoccupied.

The bold sweep of the Santa Rita mountain range, with its massive and serrated peaks, is the one commanding object on which the observing eye rests, in whichever direction the traveler approaches. The outlines of the great peaks rise hazy but bold in the distance, against the wondrously clear sky, while growing more majestic and imposing as the day's declining journey brings the traveler almost under the sweeping shadows of Mount Wrightson. It was in sight of this superb range that the old Aztecs and Toltecs journeyed, and along its base, in the beautiful valley of the Santa Cruz, passed the Spanish explorer and conqueror, priest or soldier, it mattered but little to the primitive people living in the Primeria Alta. From its once secure and savage fastness, old Cochise and his warrior Apaches have swept down on settler, miner and traveler, until the region was desolated by his forays. The mastering Spaniard—soldier or priest—never seems to have lifted those they mastered, but on the contrary were in their turn mastered by the Apache. The Santa Cruz river rises in Arizona, on the east side of the Patagonia Mountains, flowing southward a short distance into Sonora, where it makes a considerable bend and sweeps northward through the Potrero, and flowing along the eastern base of the Sierras Pajarito and Atascoso, till above the Tubac the valley broadens into a great plain in which the little river meanders until it strikes again the Sierra Tucson, near the town of that name, and along beyond the base of which it flows northward for miles, when it sinks and is lost sight of permanently. It is supposed to enter the Gila by some subterranean channel near Florence, about 180 miles from the Potrero or gateway by which it enters Arizona. The Valley of the Santa Cruz, south from Tucson, comprises that portion of Arizona of which the most is known, and in which the Spaniard and Anglo-Saxon have struggled the hardest to maintain themselves against the sullen and desperate onslaughts of the destroying savage, until at last the latter has dashed himself to fragments. Tucson marks the northern termination of the Spanish effort. Below it may be found the evidences of its most steadfast endeavor in the section under consideration. The best Spanish map handed down to us is that of El. P. F. Pedro, (a copy of which is found elsewhere) bearing date 1775. This shows quite a number of missions, pueblos, as well as two presidios, between the present frontier line of Mexico and the town of Tucson. Among these is the Mission of Tumacacori, the Presidio of Tubac, and the Mission of San Xavier del Bac, the church and building of which latter are still standing. According to Bishop Sapienta of Tucson, the first mission church of San Xavier was erected in 1690: the one now in existence, nearly a century later. The Mission of San Dominick, at Tuqueson, or Tucson, was located in 1650, about a century after Coronado's expedition for the conquest of the seven cities of Cibola passed up the Rio Grande Valley, and Father Niza wandered by this route to the ruins now known as the Casa Grande. A military post had, however, existed there for three-quarters of a century. The Mission of St. Gertrude was established at Tubac as early as 1751, a quarter of a century preceding the date of the Pedro map referred to. At that time, and for a considerable while thereafter, a Spanish garrison, with a military commandant of considerable rank, was maintained. A local outbreak, in the year named, drove out the troops and set the region back for several years. For a period of forty-eight years thereafter the Spanish adventurers, soldiers, priests, miners and rancheros were left undisturbed. The Indians rose again in 1802, and since then there was little business done or activity displayed until after annexation to the United States.

Tubac, at the present time, is a collection of adobe ruins, with a few such houses, rudely put into a semi-habitable condition. Its situation is good, located as it is along the high road to Sonora, and at a point where diverging west and south roads to such points as Sopori, the Baboquiveri, Fresnall, in the old Papago country, the Arivaca Valley and the Cerro Colorado mines, necessarily enter the main line of travel. Tubac has a history. Mr. Bartlett found it occupied by Mexican troops when, in 1850–51, he was engaged in fixing the new boundary line between Mexico and the United States. At that time it was the principal place in the Pimeria Alta, as the territory south of the Gila River, below the 33d parallel from the line of New Mexico to the Colorado River, was then known. Tucson, which has grown a great deal since that date, was described by Bartlett as a wretched place, with about four hundred Mexican and half breed inhabitants. In 1853, Colonel Charles D. Poston and Herman Ehrenberg arrived in Tubac, coming from San Francisco *via* the Gulf of California and Guaymas, across the north-west portion of Sonora and the Papago country, following on the heels of the ratification of the Gadsden Purchase Treaty. Their purpose was to spy out the fatness of the land which had been acquired for the United States at a cost of $10,000,000. No transaction has been the subject of more adverse and diverse comment than this treaty; and when it was afterward found that the Mexicans had astutely managed to cut this country off from the Gulf of California, one general cry of disgust was raised. The charge was made, and generally believed, too, that the Mexicans had purchased our commissioner. The feeling among the few intelligent Americans who were cognizant of the surroundings was, that the General signed the treaty under the influence of a habit to which he sometimes yielded. The Mexicans gave, however, much more than they withheld, in surrendering the finest mineral region on the continent—one whose richness had been known to them for nearly three centuries. Messrs. Poston and Ehrenberg were the first Americans of any position to penetrate this region, except those who were with Bartlett and his expedition. Herman Ehrenberg was a German by birth, long resident in the South; a topographical engineer and metallurgist of high repute, and a man of most decided ability. Colonel Poston, in a personal narrative, embodied by Ross Browne in his attractive book, "The Apache Country," says of this town and locality, under date of 1853:

"Arriving in the valley of the Santa Cruz, we found the old town of Tubac abandoned by its Mexican garrison and the population, which had been dependent upon them for protection against the Apache Indians, the most fierce and barbarous tribe of which we have any account. As the houses in Tubac were in a good state of preservation, we occupied them for headquarters during the ensuing winter, and passed the time in exploring the surrounding country for silver mines. The winter season here proved very mild, and our animals were subsisted upon the nutritious grasses which abounded upon the hill sides. * * The valley of the Santa Cruz is a very rich body of land, and with irrigation produces two crops annually —corn in the spring and wheat in the autumn. Wild game could be procured in abundance in the immediate vicinity, and by Christmas we had such a store of bear meat, deer, antelope and fat wild turkeys, that no apprehensions of short rations disturbed our enjoyment. * * In the course of a few months several hundred people had gathered around Tubac, and engaged in planting; the mines developed a wonderful richness; and traders from Sonora, New Mexico and California came to supply all our wants with the productions of foreign lands in exchange for the silver bars which we made 'current with the merchant.' The same gentleman, in a report made to the Sonora Exploring and Mining Company, published in 1856, says: "The old town of Tubac was formerly occupied by a numerous and thrifty population, engaged in agriculture and mining. It is the very center of the mineral region in our territory, and has probably 150 silver mines within sixteen miles. Many of them were worked by the Spaniards and Mexicans in a primitive manner, but not opened to any extent, because they had no sufficient machinery or mining tools. * * Under the Mexican rule a garrison was kept at Tubac for the protection of the inhabitants, but only of sufficient force to enable them to work their fields; the mines have not been worked for (1855) fifty years." A weekly paper, called *The Arizonian*, was started there in 1858 or '59.

Among those who have sojourned in this region, making Tubac headquarters, were Col. Samuel Colt, Mr. S. F. Butterworth, well known for his connection with the Overland Stage route, Professor Stark, Frederick Brunckow, mining engineer and geologist, Louis Janin, geologist and metallurgist. Messrs. S. H. Lathrop and C. S. Brown, both known for their early identification with mining interests on the Pacific slope, E. L. Plumb, mining expert, long connected with American interests in Mexico, who visited Tubac and the adjacent region in 1857, and Mr. Beseler, mining engineer, who arrived in 1859, were some of those who during the nine years of more or less continued mining activity made Tubac their rendezvous while conducting and operating the Sonora, Cerro Colorado, Sopori, Arivaca, Oro Blanco, and other mines and ranches in the Santa Cruz valley or adjacent thereto. The names of soldiers then and since distinguished that are also identified with this sec-



LITH. BRITTON, REY CO. S.F.

TUBAC & THE SANTA RITA Mts
from the S.E. side.

tion, embrace, besides Gen. Heintzelman, Mowry, Gen. Carleton, and others of the boundary commission service, those of Col. Bonneville, in whose regiment Gen. Grant served as a subaltern, Lieut. Michler of the Engineer Corps, Major Steen of the old Dragoons, after whom a notable peak has been named, Gen. Philip St. George Cooke, Lieut. Washburn, who headed a U. S. surveying party in 1853–'54–'55, and explored the whole Gadsden purchase. The author of the "Marvelous Country," S. W. Cozzens, who visited Tubac in 1858–9, describes it as being, with the company of the many intelligent men who had congregated there, a "very attractive place, with its peach orchards and its pomegranates." The population at the time, according to this writer, numbered 800, about one-sixth of whom were Americans. He adds, that "the only business transacted was that done by the mining company, if we except the trade in mescal, which was very extensive." All this scene of activity and enterprise, often interrupted between 1854 and 1861 by Apache raids and attacks, was brought to an end by the outbreak of civil war. The troops were withdrawn; the few officers then in the Territory mostly sympathized with and joined the south; the Apaches, no longer restrained by even a show of force, plundered and murdered almost at will. The overland mail stages were withdrawn, the stations were deserted, the territory became only a highway for fugitives to and from Texas, and across it sped such distinguished Confederate recruits as Captain, afterwards Lieutenant-General, Longstreet, who among others left the old army and California to join the South. Two companies of confederate troops occupied Tucson for a short time in 1861–2, and in the winter part of 1862–3 a regiment of California volunteers again raised the Union flag over this portion of Arizona.

The territory was organized separately in 1863. Before that date an effort had been made to procure a territorial organization. Sylvester Mowry went to Washington as a delegate. The last occupation of Tubac, until within a year past, was made by the Santa Rita Mining Company, whose gallant managers, Stark, Wrightson, Grosvenor and Hopkins were all slain by Apaches in 1861–62 and 1863, when Hopkins rendered up his life. Prof. Pumpelly describes Tubac in 1861 as the "restored ruins of an old village" which was "occupied by a small mixed population of Americans and Mexicans, while near by a hundred or more Papago Indians had raised a temporary camp of well-built reed lodges." In 1863, the late J. Ross Browne, the well known artist-traveler and humorous writer, visited

Arizona in company with Col. Poston, then holding the position of Superintendent of Indian Affairs. In chapter XIV of "The Apache Country," Mr. Browne thus describes Tubac: "There was not a living soul to be seen as we approached. The old Plaza was knee-deep with weeds and grasses. All around were adobe houses, with the roofs fallen in and the walls crumbling to ruins. Doors and windows were all gone, having been carried away by the Mexicans three years ago. Old pieces of machinery belonging to the neighboring mines lay scattered about the main building, formerly the head quarters of the Arizona Mining Company. * * Tubac lies on a pleasant slope in one of the most beautiful parts of the valley of the Santa Cruz. * * In 1858–59 and '60, during which the mines were in progress of development, Tubac might well be regarded as the head-quarters of civilization in the Territory. * * The gardens afforded a pleasant place of retreat in summer, with their shady groves of acacias and peach-trees; and deep pools in the river, overhung by willows, were cleared out and made into bathing places. * * Tubac is now a city of ruins—ruin and desolation wherever the eye rests." Mr. Browne continued with sanguine words to predict its future importance, adding, "The mines are proverbially rich; and rich mines will sooner or later secure the necessary protection for working them." He gives some interesting facts relating to the history of Tubac. In 1840, according to Velasquez, the Mexicans had a garrison here of 30 men, the town containing a population of 400. In 1853, after it was transferred to the United States, the whole Mexican population retired to Sonora. When the Federal troops abandoned it in 1861, only twenty-five or thirty persons remained. The Apaches under Cochise came down from the Santa Rita range in large force. The few Americans left kept over two hundred at bay. An express was got out during the night to Tuscon, and there a party of twenty-five men volunteered, and under the command of Mr. Grant Ourey, a well known and much respected citizen still living in the territory, went to the assistance of those beleaguered at Tubac. They drove off the Apaches. A party of Mexican robbers had also come up from Sonora. They fell back to Tumacacori Mission, on seeing the American strength, and there murdered in cold blood an old American who lived at the ranch, and whom even the Indians had spared.

The mountain range known as the Santa Rita extends for about sixty miles from north-west to a south-east direction, and is from twenty to thirty miles wide. Its general form is that of an irregular parallelogram, slightly convex on the outer or western slopes, which forms the principal ridge or section of this perfectly formed range. East and above Tubac a few miles the range sends out a long, bold spur, the most prominent portion of which is a strongly marked though not high peak. This spur is a skirmish line for the three great mounts or peaks in which the range finds its culmination. From the northerly side of Sentinel Peak, as the outpost mount may appropriately be called, the range winds rapidly to the north-east, falling away in symmetrical shape until it dies out in the foothills along the base of which the overland road passes, and which, with those of the Santa Catarina range, make a natural gateway for a future railroad from New Mexico and Texas. Southward from the Sentinel Peak, already indicated, the range swells bold and distinct, with regular sides, until it reaches the Sonoita. From Tubac the view is a striking one, grandly picturesque, and though rugged yet bold, and having, from the abundance of trees, and the regular outlines presented, elements of exquisite beauty to gratify the eye and appeal to the imagiuation. From the outpost mount the jutting spur trends easterly, rising boldly into the three great peaks which mark their range with a more striking grandeur than any other south of the San Francisco Mountain.

The valley of the Santa Cruz at Tubac is at least 3,000 feet above sea level, while the Atascoso range, to the west, that, brown, bald and bare, looks down upon the old and dilapidated town, and the lovely valley in which, like some huge daub on a fair picture, it sets—a very rugged specimen of an Arizona range—has an altitude of about 6,000 feet. The Santa Rita rises, not precipitously, like the western wall of the valley, but with a bold, grand, regular swell, until the serrated ridge attains an altitude of 8,000 feet. The elevations are only approximate, never having been accurately ascertained. Tubac sets at one end of what may be termed a semi-amphitheatre of valley and mountain—the Sierra Atascoso ranging for some twenty miles almost due north and south, until near Calabasas it trends slightly to the east, while the Santa Rita sweeps boldly back in a south-easterly line, from the point where the jutting spur, with its conspicuous advanced peak, impinges just above Tubac, on the Santa Cruz valley. Below the Sonoita is a small range, the San Coyoteano, which flanks the Santa Rita's southern wing, somewhat narrows the valley, and makes the Potrero, through which the Santa Cruz flows northward. Back from Tubac, direct as an eagle flies, the eye of the observant traveler will rest upon Mount Wrightson, or "Old Baldy," as it has been called by the Arizonian. This distinct and strongly defined peak, covered with the brown grasses of the region almost to its bold summit, towers over the valley at an altitude of 10,500 feet above sea level. Its general direction is north-west and south-east. To the north and west is a bold but lesser cone, which it is proposed to call Hopkins' Peak, in honor of Gilbert Hopkins, a famous mining engineer slain within the shadows of these mountains by the murderous Apaches. To the east and south of Mount Wrightson rises another and smaller peak, which has been called Grosvenor, in honor of another bold pioneer, who, in 1861, was slain near the old hacienda at Santa Rita, shortly before Mr. Wrightson, the manager of the Salero Company, lost his life. Professor Raphael Pumpelly, who was then engineer of the works and mines, the ruins and shafts of which are plainly seen from the Santa Cruz valley by the aid of a good glass, gives a spirited account of what life in Southern Arizona and with the Apaches on the war-path was at the time, in his valuable work, "Across America and Asia," which should be read by all who desire the testimony of an accomplished *savant* and mineralogist as to the vast mineral wealth imbedded in this range. Bold as are the sides and summits of this range, cut as it is by deep gorges and cañons, whose depths make sombre shadows in massively marked purple hues as the sunset falls, there is nothing gloomy or even wild in the great free sweep of landscape unrolled before one at Tubac, or better still at the ruins of the Tumacacori Mission, three miles below. These ruins are enclosed in the King farm. The Santa Cruz flows very near the Sierra Atascoso, at whose base this evidence of Jesuit endeavor and sacrifice is seen—a strange spectacle, indeed, in so wild a land. Looking eastwardly, the eye takes in, for some miles, a bold reach of rising mesa, whose rugged lines are made picturesque by the abundant oaks and mesquites, and are softened by the grayish-brown gramma grass, which is here so abundant. During the rainy season the Santa Rita is verdant to the summit of the ridge, and the scenery is altogether striking and beautiful. The narrow valley, at this point about two miles wide, has an abundant fringe of ash, mesquite and cottonwood trees, the latter being of the largest size. There is a sufficiency of water for all purposes, and with careful engineering, irrigation will always find ample supply.

Raphael Pumpelly describes* the approach to the Santa Rita, and the general aspect of the landscape as follows: "On our left rose the high, double-peaked Santa Rita, the highest of the mountains of Arizona south of the Gila River. A bold, precipitous spur, the Picacho del Diabolo, juts out into the valley, a promontory of naked rock, and a favorite post from which the Apache watches for an opportunity to make a raid."

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* "Across America and Asia," page 7.

J. Ross Browne thus describes* his visit to the Santa Rita: "Crossing the Santa Cruz at the foot of the Milpas, opposite the town of Tubac, we followed an arroyo for about four miles, when we ascended the right bank and entered a dry plain, called in this country a mesa, or table, stretching almost as far as we could see north and south, and bounded on the east by the mountains of Santa Rita, on the west by the Santa Cruz Valley and the mountains of Atascoso. It was a matter of surprise to most of us how luxuriant the grass was on this mesa, and what an inexhaustible support it affords for innumerable herds of cattle. * * The Picacho, on the left, forms a bold and striking feature in the scene, rising like a massive fortress on the edge of the plain, and backed by the rugged ribs of the Santa Ritas, the two main peaks of which, called 'The Teats,' form a prominent landmark to travelers for a circuit of 200 miles. * * It was a luxury to breathe the air; nothing more pure or invigorating could exist upon earth. The unclouded sky and glowing tints of the mountains; the unbounded opulence of sunshine, which seemed to sparkle in atmospheric scintillations, inspired us with a perfect overflow of health and spirits; and it was no wonder we built many castles in the air and reveled in dreamy regions of enchantment, in which the glittering silver mines of Arizona played a prominent part."

The ruins of St. Joseph Mission, Tumacacori, are located on the west side of the Santa Cruz, about a quarter of a mile from the dwelling of Mr. King. There is abundant evidence of long continued cultivation in the vicinity; and still, with the rather shiftless farming of the present, rancherias in the vicinity bring good returns. The first church building was constructed in 1752; and the one whose ruins are shown in the accompanying engraving was built in 1802. It was destroyed by the Apaches in 1820. The mission buildings, of which sufficient remain to show their character, were of large extent, and yet cover a considerable area. The church itself is partially unroofed, the chancel with its dome still remaining in fair preservation, while the nave is open to the sky and the weather. It is a rather plain structure, built of brick and concrete, or *cojin*, as the Mexicans term it. Apparently it was both smaller and ruder than the church of San Xavier del Bac, which is quite lavishly ornamented inside and out. The main structure is about one hundred feet long by forty or fifty wide. The form was that of a plain Greek cross with a basilica. The cross, emblem of the devout hope and sacrificial service which animated the Jesuit Padres, still crowns the latter, and outlines against the marvellous skies and under the shadow of the gray sear hills, the symboled passion and power of Christian zeal and endeavor. Two towers remain in fair preservation. On the west side an unroofed chapel remains otherwise almost intact, while on the other the sacristy is quite dilapidated. It has evidently been used both as a stable and granary; and the interior of the nave shows the vandal hand of prospectors and travelers. Professor Thomas Davis, Superintendent of the Aztec Syndicate Mines, who has spent the last thirty years in the mineral fields of Mexico and the United States, states that when he first passed down the Santa Cruz Valley in 1849, the church roof was nearly intact, and much of the interior was in good preservation. There were many fruit trees, pomegranates, peaches, etc., bearing profusely; and the walls that once enclosed the home, orchard and garden were still to be traced by the eye. They are now almost obliterated. The church ruins stand square with the compass, the principal front facing the south. At the rear end there is a high wall in good preservation, enclosing a circular mortuary, still perfect. Within this enclosure, formerly the ground for meditation, the wall contains niches, still perfectly defined and evidently once used as shrines. It is notable that the place of sepulchre should be the one best preserved. To the west of the church is a large enclosure, the walls of which are readily traced. It is evident that this was the work-yard of the mission, as there are the remains of arrastras, rude smelting vassos or furnaces, a few heaps of debris, etc., to show that the good Jesuits were actively engaged in the mining and working of ores. On the east of the church can be traced some buildings which appear to have been the mission residence. Part of the front wall, with gateway, still remains. Beyond this can be followed the lines of a small orchard and field, once enclosed; while in front of the church itself are the remains of another enclosure, in the south-west corner of which there are crumbling adobe walls that marked some large buildings, which, on a hasty examination, suggest out-offices, stables, etc. Judging by the examination made, the church and mission buildings proper, with their immediate appurtenances, would appear to have been enclosed and walled in the form of a cross, of which the east and west, especially the first, were the largest, while the north and south wings formed the transverse portion.

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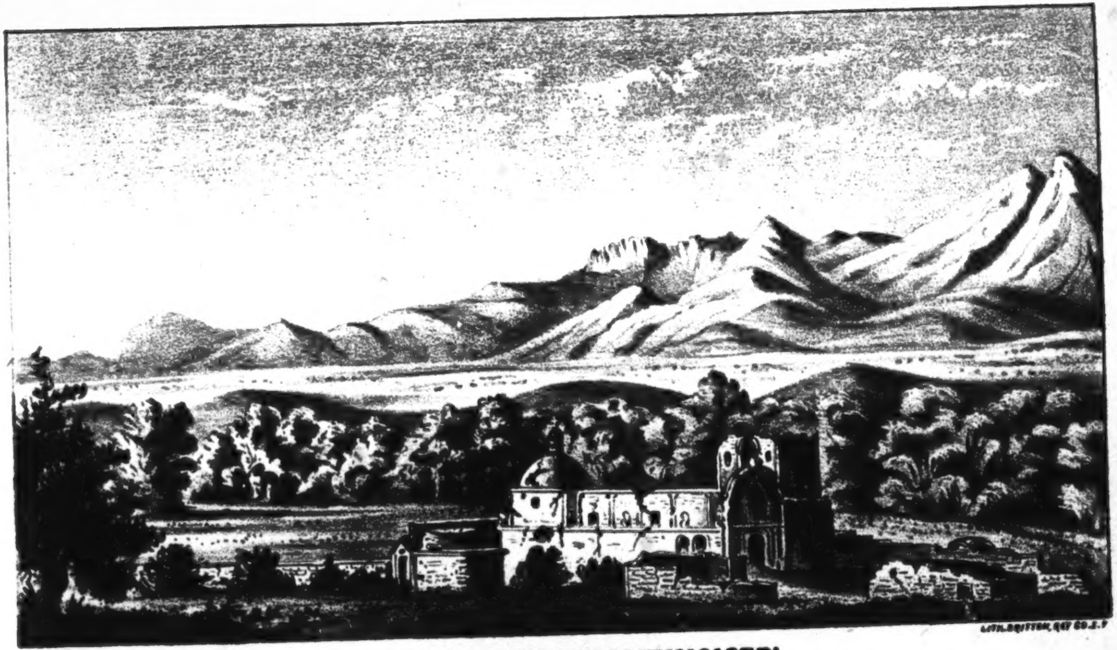
* "The Apache Country," Chap. 23, pp. 225, 226.

In the last report made to the mining organization of which he was general agent, dated 1860, Professor W. Wrightson thus describes this important point: "Tumacacori is an old mining mission, established here many years ago by the Jesuit priests. * * The church is an adobe building plastered with cement and coped with burnt brick. The front is of the Moorish style, and had on the south-east corner a tower, the top of which was burnt brick. The roof of the church was flat and covered with cement and tiles. The timbers have now fallen and decayed. The chancel was surmounted with a dome, which is still in good preservation. Adjacent to the church in the form of a hollow square were the residences of the priests, containing spacious and airy rooms, with every evidence of comfort and refinement, while surrounding those in the interior was an arched colonnade, forming a shady walk around the whole enclosure. To the east of this square of sumptuous residences was an oblong of building, where the metallurgical operations were carried on. Here are still the remains of furnaces and quantities of slag, attesting the purposes for which this was formerly used; and further still to the east was the garden, enclosing about five acres, and surrounded by a cahone wall. The acequia passes through this, and here is the remains of a washing vat and bathing place. There are also fruit trees and vines still growing; while in the rear of the church is the campus santi, a burial ground surrounded by a strong adobe wall well covered with cement, and forming even now the best enclosure in Arizona. To the south of the mission building, and fronting the church, was laid out a large square or plaza, which was surrounded by peon houses, thus forming a respectable village. * * It is not beyond the range of probability that here again, in the course of a few years, will be a thrifty settlement."

It will be seen that the general appearance of the ruins has not materially changed in the last eighteen years. The former residences of the priests and the peons' houses are now almost destroyed, but the campus sancti and the church remain very nearly the same. This property has been claimed as belonging to a Spanish land grant, floated over the region. The old Santa Rita company purchased such rights as it gave, and at the time of the foregoing writing held and improved it somewhat. But there is reason to believe that the Spanish grant claim will not hold. The church had the usual mission rights, which are recognized as a rule by the United States when used for the original purposes of such grant, but not otherwise. It is understood at Tucson, the episcopal seat, that there is no intention of reviving the mission of St. Joseph, and therefore the mission lands would of necessity lapse to the public domain. The ranch or farm, of which the mission ruin forms a part, is quite a desirable acquisition. The Santa Cruz affords considerable water power at this point. There is close by a dense body of mesquite trees, the largest in Southern Arizona.

This Mission has an eventful history. At the time of our war of independence it was in the full tide of its activity. The sagacious padres looked after not only the salvation of their Indian peons and converts, but even more strenuously sought the temporal results to be obtained for their church and the Society of Jesus, by working the wonderful mineral lodes located in the mountains that overshadow these ruins, or are outlined in front of them at a few miles distance.

The earlier and more *positive* information of settlements in the Santa Cruz valley, from the Sonora line to Tucson, show that the missions of San Xavier del Bac, St. Gertrude at Tubac, St. Joseph at Tumacacori, San Miguel of Sonita, those of Guevavi, Calabasas, Arivaca and Santa Anna, existed in 1751. In that year, one Luis, from the town of Saric, who passed himself off as a sorcerer, instigated the Indians of Pimeria Alta to a rebellion against the Spanish Government and its missions, and these Indians, together with the Serics, caused the priests great suffering and loss, killing three of their number and hindering all the missionaries in their religious duties until 1754, when peace came. They were undisturbed again at Tumacacori until an Indian rising in 1802, by which the first church was destroyed. It was replaced by the structure whose ruins are now seen. Then came the revolution in Mexico. The republic was established, the Jesuits banished, and their church property confiscated. The Tumacacori Mission was abandoned, and naught remains of their history and doings, as known to the world, but tales handed down from generation to generation, and one or two books, which speak of the Salero Tumacacori and Plancha de la Plata mines. The Salero is in the Tyndall district, the Tumacacori has never been found, and the Plancha de la Plata, or placers of silver, are located some twenty miles south-west of here, stretching across the boundary line.



LITH. BRITTON, REY CO. S.F.

RUINS OF THE MISSION OF TUMACACORI

Destroyed by Apache Indians.

In an old Spanish work, entitled "Apostolic Labors of the Society of Jesus," published by one of the most illustrious members of that order, is given the following account of the discovery of silver and gold in the Santa Rita range of Arizona: "In the year 1769 a region of virgin silver was discovered on the frontier of the Apaches, a tribe exceedingly valiant and warlike, at the place called Arizona, on a mountain ridge which hath been named by its discoverers Santa Rita. The discovery was unfolded by a Yaqui Indian, who revealed it to a trader of Durango, and the latter made it public; when news of such surprising wealth attracted a vast multitude to the spot. At a depth of a few varas masses of pure silver were found of a globular form, and of one or two arrobas in weight. Several pieces were taken out weighing upward of twenty arrobas; and one found by an inferior person attached to the Government of Guadalajara weighed 140 arrobas. Many persons amassed large sums, whilst others, though diligent and persevering, found little or nothing. For the security of this mass of treasure the commander of the Presidio of Altar sent troops, who escorted the greater bulk of the silver to his headquarters, whereupon this officer seized the treasure as being the property of the Crown. In vain the finders protested against this treatment, and appealed to the audience chamber at Guadalajara; but for answer the authorities referred the matter to the Court at Madrid. At the end of seven years the king made the decision, which was that the silver pertained to his royal patrimony, and ordered that thenceforth the mines should be worked for his benefit. This decree, together with the incessant attacks of the hostile Indians, so discouraged the treasure hunters that the mines were abandoned, as needs must be until these savages are exterminated."

Not all the priestly historians write so smoothly of this transaction, which, by the way, is commented on in every work upon Mexican mines since written and published. The reader, who should desire to see how deep in gall a Castilian may dip his pen on the same subject, should peruse a work entitled "Los Ocios Españoles," or the documents yet existing in the archives of Pimeria Alta, written by Jesuit Fathers, who were despoiled by this act of the King. Curses loud, strong and binding were showered upon the royal robber, and thenceforth such discoveries were most carefully locked up in the breasts of the Fathers, until at last the cream had been properly skimmed off. This was the real beginning toward uncovering the riches of the Santa Ritas. Then the Apaches drove out all gold seekers, and this treasure book of nature was sealed, down almost to the present day, in the blood of the explorers and prospectors, gentle and simple, Mexican and American. But, as the old Padres were wont to say that the difference of one letter made a difference of millions of souls: "All men will dare death for gold—few are they who dare it for God!" In 1817, Dionisio Robles, a courageous inhabitant of the town of Rayon, fitted up an expedition of over 200 men, and proceeded to the Santa Ritas to discover these rich spots. They fought their way for seventy leagues, found what they believed to be the old workings, but which were only the marks of the first prospectings; and as the quaint old chronicles say that "although throughout all their seeking they did find virgin silver, more or less, yet were not these large masses of treasure so readily obtained during the eight days of their stay; so that finally, after much loss of life, being daily and nightly beset with the savages, they did turn their steps homeward, being exceedingly harassed all the way; bringing home, indeed, good store of treasure, but yet no single piece of pure silver weighing in excess of four arrobas. Yet," remarks the chronicler, "will it again and again be adventured until the savages become extinct, and the superior race possess the untold wealth imbedded in these mountains of Santa Rita." These old gold hunters simply shared the fate alloted to all pioneers. But they have cleared the way for the coming man—for the race of to-day. The members of the Robles expedition unanimously agreed that the entire region was wondrously rich in minerals, and that to the east of the scene of their explorations "the range was filled with veins of gold and silver crossing each other in all directions, and upon this portion of the country did the savages most terribly assail our forces." To sit now over these musty records, and trace the adventures of the bands who, time and again, undertook to dislodge the Apache from his lost fastness in the Santa Rita; to look over the attempts from Don Ildefonso Bamilda down to our General Crook, one is compelled to award to the Apache the palm for bravery in defense of his home and his treasures inherited from his fathers. The Jesuit Fathers, who built the famous Mission of Tumacacori, almost in the heart of the Apache country, found at last how little real power they had; for when most they believed in their security and strength, after they had amassed unbounded wealth, on one fine day the red man encircled them with fire and knife, and not one padre escaped to tell the story. So ended the old mission. Not a few of the old padres, whose names yet linger in these valleys, and whose memories time has dealt kindly with, combined the love of God with the love of gold and silver, sought out the rich lodes, worked them zealously that the church might be the richer, and the heathen and unconverted the gainer. Who shall dare to say that this was not a most noble and praiseworthy work?

This region, like the balance of Arizona, is but little known to the country at large, and yet no portion of our frontier territory has ever been as extensively written about, or more thoroughly examined in years gone by, or for that matter more recently. A talented group of men, many of them widely known in the public events of the past two decades have been connected with the Santa Cruz Valley and the mineral explorations of the Santa Rita, Atascoso, Cerro Colorado and Patagonia Sierras. From 1858 to 1861 the town of Tubac was headquarters for the Salero Mining Company, and also for the Cerro Colorado and other organizations. The first named was a Cincinnati company, formed to work the Salero and other mnes to the east of the Tumacacori Mission, already described. Mr. Wrightson, formerly of the *Cincinnati Enquirer*, was its organizer and earlier manager; H. C. Grosvenor, an English engineer, was also superintendent; Gilbert Hopkins, a well known mineralogist and engineer; Professor Raphael Pumpelly, geologist, engineer and author, now Professor at Harvard, were the earliest American explorers and workers connected with this company. Col. C. D. Poston, formerly Delegate in Congress and now Register of the U. S. Land Office; Gen. Heintzelman, a veteran of the old army; Gen. C. P. Stone, now Chief of Staff in the Egyptian army; Lieut. Sylvester Mowry, S. F. Butterworth, Col. Talcott, Herman Christian Ehrenberg, Guido Kustel, and Frederick Brunckow, mining engineers of repute, were among the daring men who sought for treasure here, and while finding it, were found by the Apaches and compelled to leave. Some of them, notably Wrightson, Hopkins and Grosvenor, and also a brother of Col. Poston, lost their lives and were buried under the shadow of these "everlasting hills." The records and reports left by these daring explorers are an evidence of the vast wealth barely touched in the Santa Rita, though native Aztec, Jesuit priest and Spanish explorer have worked in them for centuries past. The importance of this region can be seen, when it is stated that seventy-five years ago the Spanish record shows that there were 150 silver mines in operation within fifteen miles circuit of the Presidio of Tubac. J. Ross Browne, in his decidedly interesting work, "The Apache Country," as also in his report to the general government on the mines and minerals of the United States; Col. Cremony in a work on the Apaches, Bartlett's personal narrative of the U. S. Boundary Survey, Dr. Rothrock of the Wheeler Expeditions, Prof. Raymond, U. S. Mining Commissioner with Whipple, Emory, Johnston, and other officers of the U. S. Army, all refer to both the mineral wealth and the great natural beauty and attractiveness of this region.

Starting from the ruins at Tumacacori into the heart of the former Apache fastness, whose mountain sides are yet fed with the blood Cochise has shed, the footsteps of later adventurers may be easily and more pleasurably traced. The activity produced by the success already beginning to crown the tenacious exertions and courage of men like Col. Wm. G. Boyle, mining engineer and managing director of both the Aztec and Tyndall corporations; of Col. John D. Graham, the able secretary of the Aztec Syndicate; of Prof. Davis, its superintendent, who twenty-eight years since prospected this region at the risk of his life; of ex-Governor Safford, the ablest Executive Arizona has had, and John R. Magee, the active and talented resident manager of the Aztec property; of Charles Brown, Tom Roddick, Captain Smith (now dead), and others, men who have never lost courage and who have steadily pressed on to their work amid privations, danger and arduous exertions—this success is in remarkable contrast with defeats and losses that have preceded the present situation. It has not been all plain sailing, however, nor are all the obstacles yet overcome. None remain, however, which capital, courage and industry will not surmount.

Such a conclusion is in pleasant and striking contrast also to what has preceded it. The great reward which may be expected is established by testimony that cannot be controverted. Humboldt long since called attention to the vast natural wealth of northern Mexico, in which the valley under consideration was embraced. H. G. Ward, author of valuable works on Mexico published in 1827, and at the time English minister to that country, is the standard authority on this topic. In volume 2, page 334, Mr. Ward writes: "The mine of Santa Rita cost them nothing, and they were induced to select it from finding that it would begin almost immediately to pay its own expenses." Judge Wilson, in his valuable work on Mexico, speaks of rich mines whose localities are known. He says also: "Gold and silver, as above said, are not the only mineral productions of Sonora.* In the part of Machachos situated in the Sierra Madre, between Tucson and Tubac, and in Mogollon, a place situated in the mountains of Apacheuria, in those of Papagueria, and near the Colorado, are found great masses of virgin iron, and abundant veins of the same metal. * * Copper is also found in * * Sierra de la Papagueria. * * Metals of lead (*metal plomoso*) abound in Agua Caliente, Alamo-Muerto, La Papagueria, * * and La Cieneguilla. * * Copperas or sulphate of iron is abundant in San Javier, San Antonio de la Hueda and Agua Caliente." Most of these points are now known under other names, and are located in or near the Santa Cruz valley. General S. P. Heintzelman, in a report on the Cerro Colorado mines and the Arivaca Ranch, under date of 1859, writes that "this country undoubtedly contains a vast number of mineral veins. * * A large outlay of both labor and money will be required to determine whether a vein is rich, and a much larger to put the reduction works in operation." Mr. Henry Howe wrote of this region in the same year, "that part of the silver deposit which in central Mexico is sufficiently profitable to work, is generally found at great depths; while in Arizona rich lodes crop out at the surface. This confirms the theory of Humboldt in respect to the deposits of silver in north Mexico, viz: that the proportion of the ore would be found to increase as you advance towards the north. This is accounted for geologically by the *dip* of the veins." Guido Kustel, a recognized authority, declared in 1860, of one vein in the Santa Rita, that if "he owned this vein in Europe, he would not exchange it for any mine he knew in Europe or America."

The late J. Ross Browne in a report made (1871) in London, summed up the result of his extended observations in this region as follows:

"I visited the Santa Rita mines for the special purpose of examining and reporting upon them; but as Professor Pumpelly resided on the spot, and had a much better opportunity of studying their characteristics than I had, it would be preposterous in me to undertake a detailed description of them, after the elaborate report of that gentleman. Suffice it to say, that I made a careful examination of the principal mines, and found them true fissure veins of great promise. So far as the excavations expose the veins, they have the appearance of being exceedingly rich; the ore is thoroughly diffused, and the walls are in every instance clearly defined and regular. Most of them average from three to five feet in thickness; ranging from two to eight feet. The Buenaventura (the western end of the present Aztec lode) appears to be a fractional division of an immense lode or body of ore, the outcrop of which is visible from the old hacienda, not less than sixty or seventy feet in thickness—probably much more. Professor Pumpelly refers to this extraordinary lode, and considers the Buenaventura a mere branch of it. Should this be the case, and I have great confidence in Professor Pumpelly's judgment, the veta madre (or mother vein) may, upon development, prove to be equally as rich as these branch veins. In that case there would be nothing to equal it in the history of mines and mining. I counted in the Salero Hill, in the course of an afternoon's ramble, not less than twenty silver-bearing veins, of great apparent richness. There must be at least one hundred of these in the entire hill, averaging from two to three feet in thickness. I distinctly remember my remark to Mr. Poston, at the time, that after having traveled over most of our mineral territory, I had never seen such indications of inexhaustible mineral wealth within so small a superficial area. The prospect may have dazzled me, and to some extent perverted my judgment; but I then believed it was the richest group of mines I had ever visited, and I have seen no cause since to change my opinion. The facilities for working these mines are unsurpassed. Most of them are so situated as to be susceptible of drainage by the tunnels; and the rock, chiefly feldspathic porphyry and hornblende, is easily blasted. Timber is found in abundant supplies in the adjacent Santa Rita mountains, where there is now a saw mill, which furnishes timber for Tucson and the military posts. The climate is unsurpassed for healthfulness, and is probably the most delightful, in point of temperature, to be found on the North American continent, scarcely varying twenty degrees throughout the year from seventy degrees Fahrenheit."

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* The lower portion of Arizona was formerly embraced in Sonora.

J. D. Bartlett, U. S. Commissioner for making the boundary survey between the United States and Mexico, describes his first view of the Santa Rita Sierra, from the west to the east, at a point south of where the Aztec and Tyndall roads fork from the valley highway to Mexico, in the following words:

"I ascended one of the low hills here, about two hundred feet in height, which approached within one hundred and fifty yards of the river. This range crosses the stream and runs far to the south on the western side. From these hills the plateau extends some ten or fifteen miles on both sides, when it strikes the mountain ranges. On the east is the mountain called Santa Rita, the highest within a hundred miles; in fact, it is higher than any we have passed since leaving the Gila; and on its opposite side, where I was in September last, there is none of so great an altitude for one hundred and fifty miles."

In an earlier portion of his explorations he gives an animated description of the Santa Cruz Valley, and of the mountain range, as his party crossed it from the east, going to Sonora, which the reader will find attractive, and the fidelity of which can be seen by illustration:

"A few miles brought us to a *puerta* or gate in the mountains; passing which, we emerged into a very broad and open plain of remarkable beauty. From the elevation where we first saw this valley, the prospect was exceedingly picturesque. Around us grew the maguay, the yuca, and various kinds of *cacti*, together with small oaks; while beneath us, the valley spread out from six to eight miles in width and some twelve or fifteen in length. Unlike the desolate and barren plains between the mountain ridges, which we had crossed between the Rio Grande and the San Pedro, this valley was covered with the most luxuriant herbage, and thickly studded with live oaks; not like a forest, but rather like a cultivated park.

The valley of the Santa Cruz is formed by an extensive marine deposit of the quarternary age. The archæan sea which once covered it has vanished, and the valley now receives only the drainage of Central Southern Arizona. Owing to the loose character of the soil, the water soon disappears from the surface. The Santa Cruz, up to Tubac, marks the western limit of a notable rain-belt, which extends eastwardly from that point about one and a half degrees, and to the south about sixty miles. North of Tubac, striking as it does the western spur of the Sierra Santa Rita, its breadth sensibly lessens, and it runs northwesterly, narrowing as it bends, until it fades out at Prescott. This rain-belt, or current, evidently comes up from the Pacific through the Gulf of California, pushing inland until it strikes the outlying spurs of the Sierra Madre, by which it is conducted, and falls as rain at the southern extremity of the belt. It again diverges, and moves northward, until it finally disappears at the point already mentioned. The rains are semi-annual, summer and winter, and the chart indicates the total annual fall to be from twenty to twenty-four inches across the entire belt. Tucson is just outside of it, but the humidity of the valley round about is increased by its influence by at least four inches of fall.

The whole country is one great plain or mesa, out of which rise the various sierras, and across which there are occasional water-courses. On the way to the mines of the Santa Rita in the Tyndall and Aztec Districts, you ascend gradually from the King ranch by a road now in good condition, and which can easily be kept in good repair. The mesa is everywhere covered by nutritious grasses, and enlivened by the ebony, oak and mesquite. The cacti are not abundant, and add only to the strangeness of the color and scene. Elsewhere they lend a weird desolateness, which is a most striking feature of Arizona out-o'-doors. The ascent is gradual, yet striking, and the outlook is bold and attractive. Before you, may be seen the grand outlines of the culminating peaks, growing bolder and sharper as you approach; behind, the eye sweeps over a broad and striking expanse of rolling plateau, bounded at the west by the rugged ridges of the Atascoso, singular in form, brown and bald in aspect, while towards the south, the Cayetano and Arizona Sierras come so near as to appear almost like a great gorge, through which a mighty torrent had once forced its way. Between these ranges are far-away glimpses in the marvelous atmosphere of other ranges and peaks, whose summits, many miles distant, seem almost near enough to be reached by an hour's ride. Closer at hand are striking cañons, not large, but peculiar; while towards the south rises a bold ridge of metamorphic rocks, down the face of which the erosions of the wind and rain have written for geologists an open page on which to trace Time's bold handiwork. Nine miles from Tumacacori, the ruins of the Hacienda del Santa Rita are reached, burned by the Apaches in 1861, under Cochise, after a remarkable fight, conducted by Capt. Smith, a half dozen Mexican employés and the wife of one of the latter, against a force of eighty Indians, directed by the Apache Napoleon in person. The hacienda was abandoned June 15th of that year, Messrs. Wrightson and Grosvenor having been slain previous to this step. The ruins are a striking if mournful object in the bold sweep of landscape. The hillside was till recently tenanted only by the dead. Several unmarked mounds, and two over which white sandstone slabs are still standing, marked with the names of Grosvenor and Slack, show the resting place of these victims of the Apache savages. The little valley in which they rest, and which is soon destined to be again the seat of greater activity than they inaugurated, is a beautiful little piece of country, with sufficient pasturage for several thousand head of cattle and sheep, with scattered timber, but enough for general use. The walls of the old hacienda are still in good preservation, and could be utilized in building. The piles of ores still remaining around the old smelting works show a great variety of mineral, and some of wonderful richness. From this hacienda to the Sonoita Valley, a distance of some eight miles, the country is much broken up, cut up with arroyos or gulches, and in some places by small cañons, remarkable for the evidence they present of mineral veins.

The old hacienda is faced to the north by the range, and on the south and east by high castellated cliffs, bold and striking in form, of dark porphyry and white tufa. The valley itself is mainly mesa land, whose outline is broken by jagged rocks rising in peaks from the plains, or by the rounded spurs of the mountain range itself. These spurs form a net work of mineral veins. The mountain drainage passes by a cañon deeply cut through the valley. Water can be had by shallow diggings. There are also some small springs near by. Through the open valley towards the west, over fifty miles distant, can be seen massive and distinct the bold sharp peak of the Baboquiveri, eagle-headed, with its long range of glistening saw-ridged mountains stretching on either side until they are lost north and south in the distance. The broad plateau descends in a gentle slope to the centre and then rises abruptly to the opposite range. During the rainy season, the prospect is exquisite—the fresh grass is verdant beyond one's fancy. Above the ruins is a hacienda of later construction, being the first building constructed by Colonel Boyle, for the Tyndall—or Tubac—company, into whose hands some of these old mines have passed. On the mountain side above to the north and west, are a number of old shafts, sunk by the Indians under Jesuit direction. The most famous of these is the Salero (or salt-cellar) mine, which tradition says takes its name from the Padres at St. Joseph once fashioning a wonderful salt-cellar out of a piece of ore, to deck the table of their Bishop who was visiting them, and being something of a *bon vivant*, had complained of the want of salt as a condiment to his dinner. The old shaft was, till recently, partially filled with water, from surface, not subterranean, drainage. The ores of this mine are known to be very rich. The dump at its mouth still establishes this. According to Mexican tradition, they yielded from $51 to $102 to each 300 pounds of ore. This is equivalent to $340 and $680 per ton. To the north and east are a number of other old shafts and drifts of greater or lesser depth and extent, which have been recently re-named after members of the English company—as the Hamilton, Abercorn, Macdonald, etc. It is the opinion of Colonel Boyle that the Hamilton will yet prove to be the lost and famous Tumacacori mine of the Jesuits. The Mexican traditions, oral and written, insist that the location of this mine was to the west of St. Joseph's mission, about fourteen miles in all probability. Many a gallant man has lost his life in vain attempts to find and re-locate it, but so far nothing has been seen to the west of the mission which in any way answers the tradition. Colonel Boyle has during the past four years made a number of efforts to find if there exists any lode or location other than the mines on the Santa Rita, which the Padres were known to have worked, that by any possibility could be made to answer the description and statements given; and he has failed entirely. According to the reports handed down, the Tumacacori mine was distant as the crow flies but a short morning's walk from the mission in the valley below. The Hamilton mine lies exactly east and less than ten miles off. There is still an old trail plainly discernible, which strikes the present wagon road some distance below the old hacienda. Mr. Wrightson, the first American Superintendent, reported on these mines in 1859, that:

"The ores are suited to both smelting and amalgamation. The smelting ores are those in which there is a very large admixture of lead, or very rich sulphurets of silver and copper. The amalgamation ores are those where the culls of silver and copper predominate. The Crystal and the Encarnacion mines yield smelting ores. The Bustillo, the Cazader, the Ojero and the Juller mines yield ores which by assortment can be treated by both processes. The Salero yields amalgamation ore."

Raphael Pumpelly, in his work "Across America and Asia," reported at length on these ores. The following extracts are taken from reports made on the mines in the old Saledo District:

"The Santa Rita Mountains rise about 12,000 feet above the level of the sea, and nearly 8,000 feet above the hacienda of the Santa Rita. The southern foot-hills have rounded forms, and sink gently to the Santa Rita Valley, where they have a height of 300 to 400 feet. The higher spur of the foot-hills, the Salero ridge, which shuts in the valley on the east, consists of a crystalline feldspar rock, containing more or less hornblende. The lower hills to the west consist of a metamorphic porphyry, having a compact gray base, impregnated with carbonate of lime, and bearing numerous crystals of opaque, white, triclinic feldspar, grains of quartz, and dark gray mica in hexagonal plates. It also contains specks of magnetic iron. This rock, in places, shows signs of bedding. Both of these rocks, the feldspar-hornblende variety and the metamorphic porphyry, contain argentiferous veins. The south wall of the valley is formed by high and castellated bluffs of porphyry, conglomerate and white trifacious strata.

"Towards the west these are replaced by a feldspathic porphyry, having a compact, light gray base, bearing numerous crystals of white triclinic feldspar and small prisms of hornblende, but entirely free from quartz. In these rocks no veins have been discovered."

"The veins of the southern spur of the Santa Rita occur on a feldspathic porphyry characterized by the absence of quartz and the presence of hornblende. They are not isolated occurrences, but, as is usual in true fissure veins, appear in groups. Indeed, the entire range of hills, from the point of the Salero mountain to the Santa Rita peak, is an extensive net-work of lodes. They differ but little in the character of their out-crops, usually more or less porous quartz blackened with oxyd of manganese, or reddened with that of iron. Frequently green, blue and yellow colorings betray the decomposition products of over argentiferous fàhl ores. There is no reason for doubting that the great mass of these are silver leads, while at the same time there is the weighty argument of analogy in favor of such a supposition. The different leads present a remarkable uniformity of character. Having nearly all the same general direction, they also possess the same combination of minerals. Many of them have been prospected by small shafts, but there are hundreds apparently equally good that remain intact. The ores of the Santa Rita mines fall into two classes—lead ores and fàhl ores, considering them mineralogically—or into three, when classified according to the metallurgical process best suited to them in this country."

"1.—Smelting ores; galena and such fàhl ores as are too rich in silver to be subjected to other process."

"2.—Refractory amalgamation ores, containing a certain per centage of lead, and requiring to be roasted before reduction, whether this be accomplished in the *patio*, the barrel, or the salt process."

"3.—Ores containing rich fàhl ore, native silver, sulphuret of silver, and other sample and complex salts of this metal, with little or no lead, needing no roasting for the patio, or no magistral, or very little."

Under the first two heads come the products of all the mines excepting those of the Buenaventura and the Mascasa, which fall almost entirely into the last division.

"Nearly all of the ores require a mechanical preparation before they can be submitted to the different processes."

The ores of all this portion of southern Arizona are chiefly silver-bearing — argentiferous galena, sulphurets of silver, and black auriferous; also sulphate, combined with iron. The gangue is usually quartz or feldspar. The copper ores are generally gray sulphurets. All such lodes, of silver and copper, show also considerable traces of gold. The most thorough and recent report of the Tyndall district is that made by Professor Thomas Davis to the English Company, who, during the past three years, have obtained control of much valuable property. Among the members and directors of the company are Williston Blake, ex-Governor of the Bank of England; Lord Claude Hamilton, brother of the Duke of Abercorn, R. S. Gladstone, cousin of the Premier; Alexander Macdonald, M. P. for Stafford, the Duke de Grammont, Paris, and others of similar grade in France and Great Britain.

The author of this report is one of the best known and most respected miners and practical mineralogists in Arizona. Thomas Davis has spent over a quarter of a century in the working of mines, and possesses also a more than fair theoretical knowledge of the sciences which are connected with his pursuits. "The Professor," as he is usually called, is one of those characters marked only, it would seem, in mining and frontier regions. He is a man of over seventy years of age, who looks "like sixty," and a hale and hearty three-score at that. He is a Philadelphian by birth. His father was for many years connected with the United States Mint as assayer. Professor Davis was in Texas in 1839; participated in all movements connected with the Lone Star Republic; was in various battles; and being captured, remained a prisoner in Mexican hands for two years. He served as guide to the American army and participated in the Taylor campaigns. He went to Africa, and being shipwrecked with others, made a long journey across the southern extremity of the continent; thence sailed to India, and thence home by way of Central America. He has been in Cuba; mined in Brazil, Peru, Australia; several years in California at quicksilver, placer, gravel and quartz, and for sixteen years past has been engaged in Mexico, having charge of large operations. The old gentleman is hardy, studious, observant, self-opinionated, but wise in his specialties; honest and temperate in character and habits, and almost as open and simple as a child in his ways. Of the character of these mines, his opinion is worthy of consideration. Beginning with the principal lode, now known as the "Empress of India," he states:

"I find it lies by barometer 4,200 feet above the sea, on the road from the hacienda to the Sonoita Valley, and about three miles north of the old Salero shaft. This vein has an easterly and westerly direction, with large croppings from 100 to 300 feet wide for a long distance. The vein shows metal the whole width in many places. There are three small holes, sunk on the vein many years ago, in which I found some ore exceedingly rich. I should judge the vein would average $100 per ton all through. The vein-matter is porphyry, gneiss and quartz, strongly colored with iron, and containing some manganese. Streaks of green silver are found all through the vein. The general formation incasing the lode is granite. A deep arroyo cuts the lode, in the bottom of which the vein is as prominent as anywhere else. Going north from the vein about two miles, we cross several large veins and large quantities of float, and come back to the Broghill Lode. This vein has an east and west course, cropping out over a mile from ten to fifteen feet wide—vein-matter principally barren quartz; eastern end, however, shows some mineral. Can form no idea without development. Formation good. North of this lode some quarter mile, lies Robley Lode. This vein is 4,400 feet high, north-east and south-west course; the vein crops out at intervening spaces. Some four or five holes have been sunk from ten to eighteen feet deep. I examined three of the deepest, and found the vein-matter from eight to ten feet wide between walls, with a metal streak from eight to ten inches wide. Here you have a good quality of milling ore, with a character of green and black silver mixed. North of this lode some 500 yards, lies the Sedgwick Lode; about the same height. This vein has very small croppings, the country being broken and cut up. I found one shaft some twenty feet deep, showing vein-matter from wall to wall seven to eight feet, with a fine metal streak from twelve to twenty-four inches wide. Formation and country similar to the other. One thousand yards north of this vein I found the Gibbons Lode, with an east and west course. This is a very large lode, four thousand eight hundred feet high, with a character of ore similar to the Salero. This lode, lying on the east side of Salero Hill, and running as it does, I should judge might be Salero Lode. From an old shaft sunk some twenty feet deep to the Salero shaft is not over one mile, and nearly directly west, but the broken country destroys all traces of the vein. This vein shows from fifteen to twenty feet in width; vein matter—gneiss, syenite, porphyry, with green and black silver intermingled. Still some 500 yards further north, climbing up the divide, I find the Macdonald Lode, with an altitude of 4,850 feet, and also an east and west course. This vein has a shaft some fifty-eight feet deep, with thirty feet of water in it. Could not get down * * * The vein carries metal all the way down, principally galena. Near the surface, in a few places, I found silver, commingled with chloride. Some 400 yards still further north, and on the top of the divide, 5,100 feet high, crosses the Gedge Lode, with an east and west course; crops out for half a mile; general character of ore, galena. Some three or four old workings on this lode show a vein from twelve to twenty-eight inches wide. I am not as favorably impressed with the surface indications of this lode as the others. Abercorn Lode can be traced by float and croppings for nearly one mile, running along the east slope of Salero hill, on over a divide, between the Gedge and Macdonald Lodes, down into the valley, and on again up another slope. There are but two or three small holes some three or four feet deep. I am so favorably impressed with what little is shown, that I am under the impression that this is one of your best lodes. The Salero Lode lies on the western side of the Salero hill. There is a very old shaft, some sixty odd feet deep, one quarter of the way up the hill from the valley. At the foot of the hill are some old buildings, where, I am told, Americans lived who were trying to work some of these mines. A wagon road has been built up to the mouth of this old Salero shaft. I was not able to get down into the shaft. The hill presents on the surface a stratum of veins. There are several holes and shafts from two to twenty feet deep, in all of which appear veins. The hill is very precipitous and shows a gradual wash-down of rock and debris for centuries perhaps. The formation is granite, and from the many strata of veins it would seem by development that it was impossible not to strike large veins of mineral. If we are to believe one-half of the stories about this mine, some fabulously rich ore has been extracted. About the old dump and the houses are quantities of ore, which show from this vein, and are very rich. There appears to have been more work done here than at all other portions of this property. The facilities for working this vein are admirable. The hill has an angle of about forty-five degrees; a level could be driven upon the vein to reach the center of the hill at a depth of 400 or 500 feet. I did not get up to the top of the hill; was at the upper end of the Salero mine, 5,700 feet high. Should judge the top was over 6,000 feet high by the barometer.

"The Blake Lode lies north of the Salero about one mile, on the same range; east and west course; about 4,300 feet high. I found one open cut, about three feet deep, showing manganese and green silver vein matter, eighteen to twenty feet wide; character, iron rock imbedded in porphyry. Could not tell whether the vein carries mineral all the way across or not, owing to insufficient development. Formation, granite, indicating permanence.

"Hamilton Lode lies north of the Blake some 400 yards, running parallel with it. Found four old shafts and workings from ten to twenty-two feet in depth; height at upper shaft, 4,600 feet. This is an immense vein, or rather two veins exactly parallel and nearly contiguous. Are all of a high grade; should judge would yield $200 per ton; vein well defined, from eight to ten feet wide and growing wider as you go down—metal the whole width of the vein, and all of the works show the same. This I consider the best lode of the whole property, and a paying institution in itself.

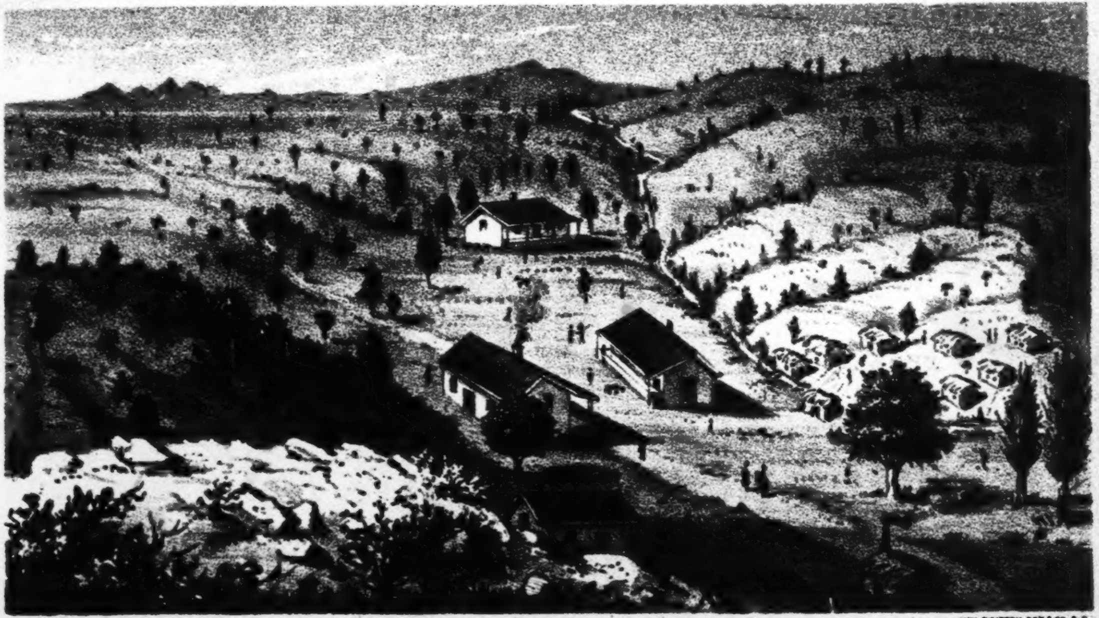
"Grossett Lode lies a few hundred yards north of the Salero Lode, running down towards the old house in the valley. Country very rough and broken; vein crops out only in a very few places. One small cut has developed heavy black iron rock with but very little mineral.

"Buenaventura Lode lies about one mile and a half west of the Salero Lode and within a few hundred yards of the Hacienda del Santa Rita, with an east and west course. There is a cienaga, or water marsh, where the vein rock has thrown the water to the surface right on the lode. Two holes have been sunk, which have water in them all the year. This ore is of the same character as the Salero. The vein shows in these holes from sixty to eighty feet wide.

"The Allen and Bell Lodes are in the Santa Rita Valley, a mile or so west of the hacienda. These two lodes run parallel with each other, showing large outcroppings and float, with mineral-stained rock. No development to show anything."

The road to the Toltec camp, now a busy little center of mining activity, and for the time being the working headquarters of the Aztec Syndicate's operations, whence everything connected with the works on the Aztec, Inca and Iturbide mines is directed, branches from the Tumacacori wagon road at some distance west of the old Hacienda. Crossing another deep and rough arroyo, down which during the rainy season quite a body of water pours, it passes for about three miles over a comparatively level mesa, rising gradually and having a more rugged aspect than the route up from the Mission. It is flanked on the west side by the cliffs already described in writing of the Hacienda del Santa Rita, and on the other side by the south-by-east spur of the range itself. As you journey, upon the right the eye notes the fantastic outlines of the high colored bluffs, and takes in a broad expanse of country, far beyond the Sonora line, and embraces the Oro Blanco on one side and the Patagonia's dim outlines on the other. Cacti become numerous, while the dwarf oak and mesquite remain abundant. Toltec camp lies at an elevation of 3,000 feet in a small valley made by the slopes of the range. Opening up to the south-west is the mouth of a small but remarkable cañon, and towards the north leading up, the arroyo follows the range into a bewildering network of mineral lodes and veins. In May, 1877, the only sign of preceding activity visible was a little adobe house with a small ore heap near by. There is considerable and increasing evidence of industry now-a-days. The valley affords space for a mining town which is already beginning to grow thereat. The waters that come down from the mountain, cutting and wearing the granite, have strongly defined the arroyo, and passing some distance beyond the camp, have cut a passage through the immense quartziferous ledge on which the Empress of India lode has been traced, and falling down a distance of two hundred feet form a cool deep pool below, which is apparently fed also by a living spring. It has never yet been found dry even in the hottest of seasons. The water has worn a deep cleft through the adamantine rock, looking down which the eye can easily detect strongly defined indications of the presence of mineral veins. The Aztec District contains a large number of mines, located by the Syndicate and by private prospectors. It commences at the east end of the Empress of India mine, runs west of north along the eastern boundary of Tyndall, thence due north two miles, thence due east three miles, thence due south six miles, and from there westerly to the point of starting. Every thing possible is favorable to cheap mining and rich ores. From a report made on the indications traced by the locators and prospectors, the following extracts are made:

"Commencing at the southern end, we find the Empress of India Lode stretching from the Tyndall District across into the Aztec, and running easterly for over two miles. There are



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TOLTEC CAMP

Aztec Dist.^ct

three locations on this lode in the Aztec District—the Montezuma, Inca and Hidalgo. The lode the full length of these mines crops out boldly, sometimes in high cliffs, and has a general width of from 80 to 300 feet. There has been no work done on any of these three mines, but in the Tyndall, 1,500 feet from the Montezuma mine, are some old workings on the Empress of India mine. Here the lode is over 200 feet wide, and shows metal the full width of the lode. In these shallow, old workings, some three or four feet deep, we have picked out ore that will assay $800 per ton. The character of the whole lode is the same, and streaks of metal can be found of green and black silver mixed with manganese from one end to the other; in some places yellow chloride. The vein matter is porphyry, gneiss and quartz, strongly colored with iron; general formation incasing the lode is granite."

North for some miles from the above lode, the Apache, the Iturbide, the Almoner, Coronado, Abundancia and Lost Lodes have been located, with the following named mines thereon: Apache and Cochise, Iturbide and Juarez, Almoner and Oro Estampado, Abundancia and Joaquinata, Coronado and Plata Plata, and the Lost. The Mexatile is a mine with rich indications, located by itself. The report speaks of another notable development:

"South a few hundred yards from the above lode we find the Aztec Lode, with three locations—the Aztec, the Anahuac and Toltec mines. This is a most wonderful sight for mineral. Commencing at the western end of the district, with a surface showing of forty-six feet, it gradually enlarges to about the middle of the Aztec mine, which there shows 286 feet width in the bottom of an arroyo. From this arroyo, along the east end of the Aztec, up over a high hill on again easterly, the whole length of the Anahuac mine, crossing deep arroyos, this wonderful vein shows a crop of not less than 270 nor more than 300 feet. On the western end of the Toltec mine, the vein is covered by washings from a precipitous hill, but on the east end it shows in places again. The croppings on this lode are never over two or three feet high, and for 1,700 feet you could not tell at a distance there was a ledge at all. In the arroyo on the Aztec mine we picked out several pieces of fine yellow chloride, and green and black silver. This vein we consider as second to none in either the Tyndall or Aztec districts. By developments, which can be done cheaply and easily, a wonderful body of mineral will be found. The formation is perfect—casings of the lode granite, as in the whole district."

The country north and east of the Aztec is mountainous and broken, but shows good minerals. Beyond are located the Sambrano Lode, with three mines—the Sambrano, San Ildefonso and La Purissima. The Jefferson and Georgia mines, located on this lode, in Tyndall District, also belong to the Aztec Syndicate. Two others—the San Ignacio and Rosario—are in the same locality. The general character of the district is syenite, granite and porphyry, and the evidences of mineral are sufficient to arouse all energies. There are plenty of locations to occupy. In a number of places on these lodes faint traces are to be found of a peculiar working of extremely ancient date; the ledges show cavities across their surface in which grass is now growing, but by digging down through the loose earth we strike on to broken pieces of ore separated entirely from the ledge, which would indicate that some class of people, in a former age, cut the top of the ledge off, at places where mineral glittered in large quantities. Near the Empress of India, evidences of old workings are quite plain, and also, to all appearance, of a rude circular defensive work, built up from broken quartz. The ground within has been dug up, yet in one corner is seen growing a mesquite tree, at least eight inches in diameter. These trees are of very slow growth, and as this had evidently started after the breastwork had been piled up, the latter must be quite old. The nature of the site indicated an outlook, commanding, as it did, all approaches, except on one side. There were two or three shallow diggings or shafts near by. From across this precita or mountain gateway the great ledge already described can be traced for several miles quite plainly by the naked eye. This region is bound to be the center of a mining development equaling, if not surpassing, the development on the Comstock. The Sierra Santa Rita contains at present a population of several hundred, waiting the advance of the Aztec Syndicate in the construction of their mills and other works. The mountains are full of locations. These sierras are formed of three parallel ranges, with deep, transverse valleys. The south side is covered with heavy pine timber, and all over it, in the open intervals and lower sides of the ranges, are to be seen low, broad-branched oak trees, with an occasional mesquite. The entire range, with the exception of three peaks, is covered with grass, which, as is characteristic everywhere of the American mountain plateau, cures itself on the ground. Cattle can thrive on the feed which may be found on the mountain summits. The general appearance is not unlike the Colorado Park system, except that one misses the towering snowy ranges. Nature has nowhere in the North American Cordilleras brought together as many attractions for the hardy pioneer, explorer, miner and *savant*. Looking east at the range from Calabasas on the opposite side of the Santa Cruz Valley, the observer would take in the gorge in which the Toltec intervale, with its busy camp, is enclosed. Mount Wrightson is here, as elsewhere, the great feature of the superb landscape.

The eastern side of the range presents as attractive an aspect for its dry placers and range of grazing country as the valuable western slopes and spurs do for their mineral wealth. The dry placers are found in the eastern valley and beyond on the road to Camp Crittenden. They have been worked more or less thoroughly for between two and three years past. There are two small camps, Steele's and Hughes', where stores are kept. As many as two hundred persons have been employed therein. These placers are located among the foothills. The soil is shallow, and wherever the old water-courses are marked in the ravines, gold can be found—generally, too, in small nuggets—for a space of about two feet wide and down to the bed-rock. A few nuggets of the value of $100 have been found. There are two or three dry-placer machines in use, but most of the pay dirt is taken out on the backs of burros and Mexicans a distance of two or three miles to water. Some silver is found with the gold, which is regarded as a good indication.

As to labor, for which there is yet but little demand, the prices range as follows: Miners (white men) get from $2 to $3 per day; Mexicans and Yaqui Indians from 50 cents to $1.50. Agricultural hands (Mexicans) are paid $15 a month, with sixty pounds of flour, eight of beans and four of salt. There is no demand for American labor of this character. Where the laborer finds himself, $1 per day is paid. Mechanics will earn about $5 per day. A few such may find employment. Board ranges from $30 to $50 per month.

Coming from the direction of the San Pedro and south through the cienaga, a wide, beautiful view opens before the traveler. For miles, south, east and west, the magnificent rolling plain is outspread. Every foot of the surface is covered with grass. Clumps of Emery's oak are found growing among the foothills. They are just dense enough to afford a shade, and yet do not interfere with the growth of the grass. There is no undergrowth of bushes, so that the scene fairly bears comparison with a park. Streams with water, warm but pure, from the mountain, flow down almost every ravine. Springs are abundant, and furnish a large volume of water. Higher up on the mountain side pines and scrub oaks grow abundantly. Tucson and the country about is supplied with lumber from this region. This is the character of the country from the cienaga south to the Santa Rita, past Camp Crittenden, which is now abandoned. The valley of the Sonoita proper begins at this old post, and extends therefrom south and west. In fertility of soil it is unsurpassed. The corn grown there would be unequalled on the Missouri bottom lands, and will average ten feet in height, being well eared also. The sunflower (evil-indicator of fertility) grows to an enormous size. All the vegetables are produced in abundance. The river rises and sinks several times within twelve miles south of Camp Crittenden, but there would be no engineering difficulty in preventing this by the construction of a new channel. The cost would not be large. The Aztec organization has located its mill-site and reduction works on the Sonoita, at a point not more than five and a-half miles in a direct line from the Toltec Camp in the Aztec, and about nine miles from the old Hacienda, in the Tyndall District. The distance by the road from Toltec, as now located, is about five and a-half miles. There is an abundance of water, not less than from 400 to 500 miners' inches being available at the mill-point, while the fall for about three miles is from sixty to eighty feet per mile. There is a good supply of timber also — ash, walnut and other hard woods being available. The hills are covered by a growth of dwarf oaks, enough for many years to come. The Tubac Mill and Mining Company is now incorporated, with headquarters at Tubac, for the purpose of constructing reduction and smelting works at a point on the Sonoita. Professor Rickard, of London, who will be in charge of the works of the Aztec Syndicate, is preparing to erect mills and also his newly patented oxydizing furnace, in which the ores will be treated. It is worthy of note at this point that the valleys of the Sonoita, Babocomori and of the Santa Cruz give two luxuriant crops annually. Barley and wheat are sown in November and harvested in May, and corn may be planted in June and gathered in October. This sort of cultivation has been done for generations past on the same land, and without returning aught to the soil, by the Mexican and Indian rancheros. The portulacca and chenopodium, which grow on the lower grounds, have been resorted to as anti-scorbutics when other food of proper character could not be obtained. The giant cacti almost dis-appear on the grassy plains and in the valley east of the Santa Rita, but grow more abundantly on the southern slopes of the Santa Catalina, to the north, than in any other portion of the region. The vicinity of the Santa Rita is also full of interest to the naturalist. Valuable additions to science have been made there by members of different U. S. exploring expeditions. Among the rare animals is the dwarf deer, no specimens of which have been found in the United States except in this vicinity and that of the region south of Mount Graham. They are very handsome and attractive, and not especially shy. In the neighboring State of Sonora, also, they may be found, but, except in some portions of northern India, none are known to exist elsewhere. The variety of birds is quite large, some being peculiar to the region. The larger degree of moisture has its effect in the variety of coloring in both birds and plants. Among the feathered fauna are several varieties of humming birds, and a number of finches. The ground squirrels are numerous. Black antelope are also seen. Wild horses are still not uncommon on the cienaga, and in the grassy intervales of the Babacomori. The long-eared owl is also peculiar to this section, and another member of this family has the curious habit of being abroad only in the early morning, and of associating in groups. Grouse of a dusky hue are found on the southern ridge of the mountain range. Reptiles are abundant; but with care no danger need be apprehended. Eagles, "soaring high on pinions wide," are not uncommon. A rare specimen of the falcon has been seen, and the American vulture is a denizen of these valleys. Dr. Rothrock, of the Wheeler Exploring Expeditions, in the report for 1875, who traversed eastern Arizona during that year, from Fort Wingate, New Mexico, to the Santa Rita mountains, speaking of the climatic conditions, writes: "Sun-stroke is almost, if not entirely, unknown." The excessive heat indisposes to active exertion, but, adds the Doctor, "this feeling is not akin to exhaustion, and it is common to all tropical and sub-tropical regions alike." The Sonoita Valley is regarded by him as liable to malaria, which however he adds would be greatly overcome by "drainage, and the removal of the exuberant living and decaying vegetation" which is now so marked a feature of the place. He recommends a judicious use of quinine, combined with iron, which will often prevent and usually cure. "There is," he adds, "in reality no obstacle to settlement," these diseases "being, in fact," those "with which we are most familiar east of the Mississippi River." Dr. Rothrock's general conclusions, though summarizing his observations of a wider area than the one under consideration, apply with great force to that section, and are worthy of reproduction at this point:

"First, that the soil, particularly that resulting from decomposition of the volcanic and sedimentary rocks, possesses the elements requisite for vegetable growth, and will produce crops when water sufficient for irrigating purposes can be had; second, that almost all points accessible to water enough for herds can be utilized as grazing ground; third, that the forests, though localized, contain timber enough for the wants of these regions for many years; fourth, that large areas, now abandond for want of water, can be cultivated by a system of tanks which, during times of plenty, shall store the surplus water for future use during the critical growing times of the crops; fifth, that under the conjoined influence of agriculture and forest culture the excessive waste of water in surface drainage and in rapid evaporation will be lessened, thus procuring from the same rain-fall more lasting benefit; sixth, that the prevailing diseases are of less than usual fatality, and can, in many cases, be absolutely prevented or readily cured, and that these diseases will diminish in frequency and severity as the country is brought under cultivation.

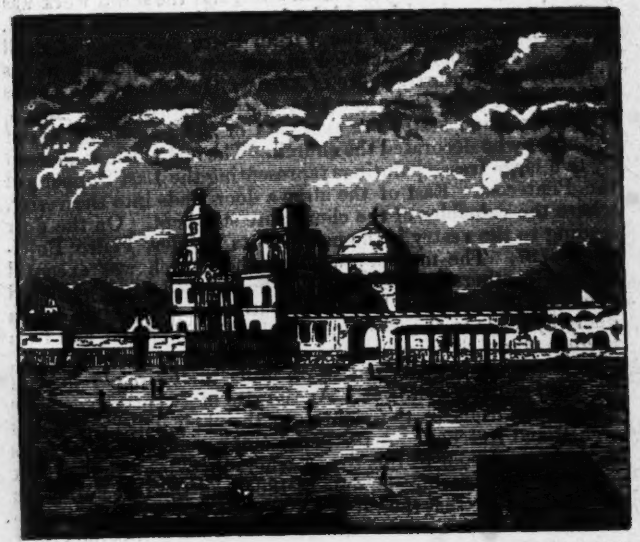
"The immigrant must not anticipate seeing an immense stretch of country everywhere alternating in beauty between greenswards, heavy forests, and abundance of water, like the familiar spots of the East. He must expect at present to find sterility and aridity impressing their hard lines on every feature of the landscape; but he must also remember that Utah, so large a portion of which is now covered with fertile farms, with vineyards and orchards laden with fruit, was only a few years ago almost as unpromising as Arizona now is; that it is still within the memory of man that prophets of ill-omen predicted that California, now one of the granaries of the Union, could never furnish flour enough for her own use. We may fairly expect, under the demands of our increasing population, that these waste places will be redeemed and made tributary to our civilization. Labor, here as elsewhere, will bring its reward; but acres of waving, maturing crops will not come unearned." Besides the material results, the strangeness of forms and the marvelous atmospheric effects of the climate hold the senses of all whose imagination is alive to natural beauty. Among the most attractive results of the rarefied atmosphere, the deep, clear sky, and the rich, strange colors which are seen and felt on every hand, is that witnessed at midnight; it will not soon be forgotten, even by the most unimpressive and matter-of-fact of observers. The nights grow cool, no matter how heated the day has been; and, sleeping out of doors, the unaccustomed traveler will seek fresh covering in the high noon of night. He will indeed be very dull and very tired if he turns to sleep at once. Above, the deep arch glows, intensely blue and clear, as deep and azure-hued as the fairest of Italian skies. The stars look marvellously large and bright, and present a far more countless host, it would seem, than is observed in other latitudes. Lying on the rude earth and looking up to the wide dome above, it appears as if the glittering planets were coming down to crush and destroy. The feeling evoked is one of awe, intense and hushed. The deep interstices grow deeper and grander as the eyes are strained in solemn wonder. There is above the horizon-edge a warm, gray tint, plainly fretted where it fades out and is absorbed by the intense azure above. The horizon is aglow with a rich hue of faint rose, shooting up 'libidinous prongs,' (as Walt. Whitman says) and fading and passing, as the early dawn comes apace, into a pale golden tinge. These skies are translucent in depth; wondrously varied in tone; a constant delight to the imagination, and continually playing fantastic tricks with the observer. No poet or artist need ask a finer inspiration than the marvellous glory of an early sunrise on the slopes of the Santa Rita, watching the bold brow of Mount Wrightson, as it is unveiled by the rising sun from the pale gray mists that have gathered around the peak during the night. The great bars of crimson, the brilliant masses of gold, the deep purple hues that rest on the ridges and wrap the abrupt gorges of the range in wondrous beauty, with the rich tints of amber and aqua-marine dying out in the dazzling blue of the atmosphere—these tend to make a picture that, once seen, will long be remembered, enhanced as it is by the striking features of the physical formation, and the strange aspects of the vegetation that rises all about one. Gray grass, weird-looking cacti, brown mountain sides, rocks painted in dazzling colors by the erosion of wind and rain; a broad stretch of landscape; strange-shaped peaks, all combine with the spur to adventure which follows the presence of unworked mineral wealth, to make this region one of the most attractive within the borders of the Union.

CHAPTER VIII.

THE SANTA CRUZ WEST TO PAPAGUERIA.

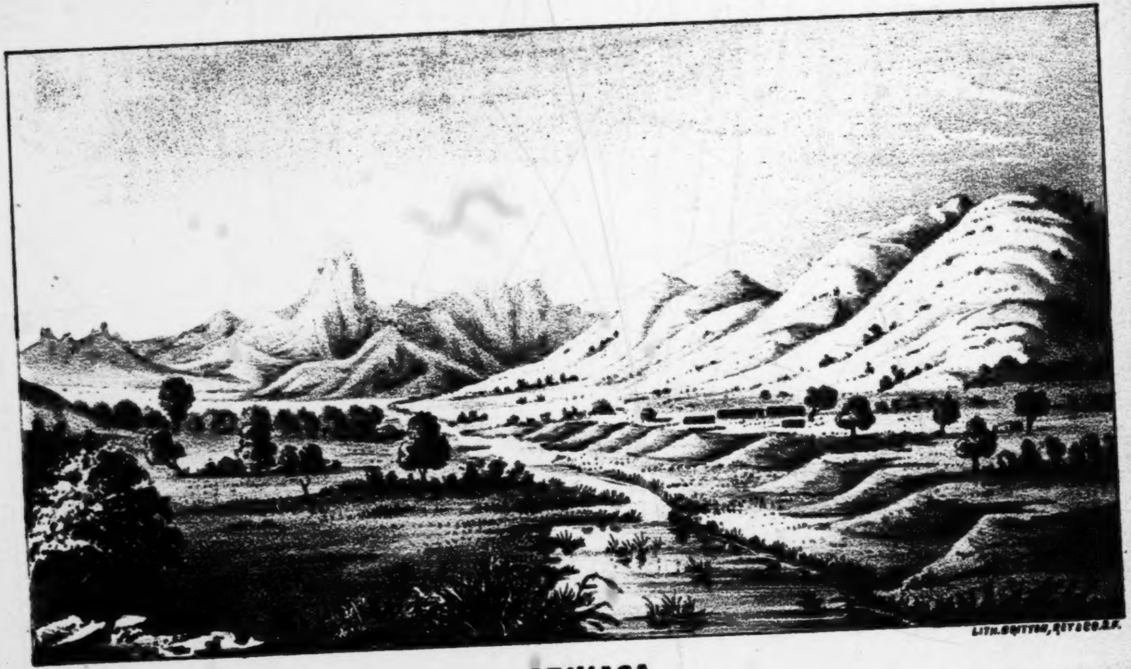
San Xavier Del Bac; Revanton; Sopori; The Cerro Colorado; Arivaca; Cababi; Oro Blanco; The Papagueria; A Strange Region; Old Mines; Mexican Mines; Robbers; Copper and Silver; Lava Fields.

Starting from Tucson, the country forming the western portion of the upper Santa Cruz valley, and the strange, wild region known as the Papagueria, is among the most interesting portion of Arizona. The first object of interest is the Papago Mission and Reservation, with the remarkable and well preserved church buildings of San Xavier del Bac. The Indians number about 5,000, and are among the very best inhabitants of the territory—brave, industrious, sober, and chaste. Their farming illustrates what may be done with land when water is applied. The site is well chosen, with a broad sweep of plain and valley, bounded in by the purple-shadowed mountains. Our business is with the church, which is most certainly a remarkable object to find in such a wild country. The present building was commenced in 1768, on the site of one of the same name which had gone to decay. It was completed in 1798, with the exception of one of the towers, which is yet in an unfinished state. Its dimensions are 115×70 feet. The style of architecture is a rude mingling of the Moorish and the Byzantine. The building is surmounted by one dome and two minarets, and the foundation walls are of brick, with a fine coating of cement. The outside walls are of brick, also cemented. The inside walls are of stone and cement, plastered and stuccoed, and the interior has the form of the Latin cross. The church fronts to the south, and the front center is covered with scroll work, having also the coat of arms of the Franciscan monks, which is a cross, with a rope coil above, and two arms below, one of which represents that of Christ, and is naked; the other one that of St. Francis de Assisi, and is partially clothed, St. Francis de Assisi being the patron of the church. A life-sized bust of St. Francis Xavier adorned and surmounted the front, but the head and part of the bust have been broken. The roof is surrounded by a brick balustrade, cemented, and at each angle and corner are griffins worked in cement, forty-eight in all. On the outside of the church to the west is an open niche where the Papago Indians were formerly congregated for morning prayers, and adjoining this was the burial ground and dead chapel. To the south of the church the old convent buildings have been renovated and occupied. For several years past four sisters have lived here, teaching and caring for the Indian sick. The inside of the church has the form of the Latin cross, the foot being to the south, and extending thence to the north end, where the main altar is. The walls and ceilings are tastefully decorated and frescoed. The main altar is dedicated to St. Francis Xavier, and one of the central chapels to St. Francis de Assisi. Four large fresco paintings represent the Annunciation, the Visitation of the Virgin to Elizabeth, the Nativity of Christ, and the Visitation



SAN XAVIER DEL BAC.

of the Magi. The altar work and all the cornices are done in cement, as are also the six arched ceilings overhead, the main one of which is fifty feet high, and the others about thirty feet high. The ceilings were all frescoed, but much of this has been defaced by time and the elements. The Four Evangelists, in sculpture, adorn the main altar, and the scroll work was formerly covered with gold leaf, now dimmed and defaced. In the lateral chapel of the Virgin there is a cross of small pieces of ironwood, imbedded in cement, on which there was formerly a sculptured figure of Christ. In two of the angles of the main arch there are two statues, representing angels, which tradition states are portraits of the two daughters of the artist who decorated the church. The main aisle is adorned by two large fresco paintings representing the Last Supper and the Pentecost. East of the altar a door leads into the vestry, where the valuables of the church are still kept. On the door leading to the vestry is the name of its builder, Pedro Bojorques, 1797. The masonry work of the church was executed by two brothers named Gauna, who evinced great skill and genius in their work. From the south end of the main aisle a doorway leads to the west, into the baptismal chapel, and from there a flight of winding stairs, consisting of twenty-seven, twenty-one, and twenty-one steps, leads to the upper floor of the west minaret or tower. At the rise of twenty-seven steps a doorway leads to the right into the choir gallery, which is arched and frescoed. A further rise of twenty-one steps leads to the second floor of this tower, where there is a chime of four fine bells, one bearing the date of 1804, and the three others so defaced by time that their date is obliterated. A doorway leads to the roof of the main building, and on going across the visitor enters the east tower, where but one bell remains of the four formerly there. The date of this one is also obliterated by time. Returning to the west tower, the visitor rises the last flight of twenty-one steps to the upper floor of the tower, from whence a fine view is obtained of the beautiful valley of the Santa Cruz, of distant mountains and peaks, with many evidences of upheavals and eruptions. The steps leading to the upper floor, sixty-nine in all, have a rise of ten inches each, making the whole rise fifty-seven and one-half feet. Taking the edifice for all in all, it is a fine structure, and presents a fine illustration of the energy and sagacity of the Catholic mission by whom it was erected. But their best monument is found in the tribe they civilized, and the enduring character their teachings have so steadfastly impressed upon them.



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ARIVACA

Leaving San Xavier, the traveller reaches Tubac, on the direct valley route, or Sopori, on the Altar road, to the west thereof.

The Sopori ranch possesses great advantages as a mining and grazing region. Embracing over twenty square leagues of mountain and valley, it comprises within its boundaries some fine silver and copper lodes, and the best of cattle ranges. During the greater part of the year it is well watered, but there are times, of course, when the water is scarce. By means of acequias, a considerable extent of bottom land, of a very productive quality, has already been cultivated. The usual cereal crops thrive well here, and esculents are especially fine. Wood, of many valuable varieties—such as oak, ash, walnut, cotton-wood, willow, and mesquite—grows in the ravines and along the margin of the creek. Lying twelve miles south of Tubac, bordering on the Mission lands of San Xavier del Bac to the north, and distant but forty-five miles from Tucson, on the highway to the Cerro Colorado, Arivaca, and Sonora, it possesses great advantages of location, and a climate unrivalled for its salubrity.

From Sopori, the road to the Cerro Colorado is also the public highway to Altar, Saric, and other points in Sonora, down to Port Libertad, on the Gulf of California. It runs through a broad, open valley, abounding in groves of walnut, oak, ash, and mesquite, fringing the bed of a creek, which is usually dry at this season. Numerous arroyas, extending down from the gulches of the neighboring mountains, in which the sands are drifted by former floods, show that the country is not always so destitute of water as it is at present. The valley extends nearly all the way up from the Sopori to the foot-hills of the Cerro Colorado. It is covered with a luxuriant growth of grass, and is one of the finest grazing regions for cattle and sheep to be seen in the Territory. Sufficient water for stock can be had anywhere along the bed of the creek by digging a few feet. On the north side there is a rise of several hundred feet to the level of a mesa, which extends, as far as the eye can reach, toward San Xavier del Bac. This plateau is dry and rocky, but produces fine grama grass, and furnishes an inexhaustible range for sheep. To the southward lie the rolling hills that join the Atacosa Mountains. These are also covered with grass, and dotted with palo-verde, mesquite, and cactus. Wild game of all kinds is abundant in this region.

A prominent landmark for several miles before reaching the former headquarters of the Arizona Mining Company is the conical hill of reddish-colored rock, called by the Mexicans the "Cerro Colorado," from which the district derives it name. J. Ross Browne thus describes it: "Standing on a rise of rolling land, isolated from the neighboring mountains, it presents in its conformation and coloring a singularly picturesque feature in the scene. Back of this curious peak, to the north, lies a rugged range of mountains, upthrown, as it were, out of the earth by some tremendous volcanic convulsion. In this, the strangest confusion of outlines and colors prevails; it is literally a chaotic wilderness of rocks, boulders, porphyritic pillars, masses of lava and scoria; weird and terrible, yet magnificent in the immensity of its desolation. Well has it been named by the old Spaniards the *Mal Pais;* yet no part of God's creation is utterly valueless to man."

At the present time there are some evidences of renewed activity, but the traveller will be chiefly surprised at the evidences of past activity that are to be seen on every hand. The ruins of the works and village are very extensive, and show by their evident arrangement for defence the character of vigilant warfare the Apaches carried on. Remains of arrastras and "whims," with various massive beams scattered about, showed to some extent the large amount of labor expended upon these works. The entrance to the mine is close by the tower, now in partial ruin. The shaft has been sunk to a depth of a hundred and forty feet, and has been for some time partially filled with water. The completeness and durability of the works will be a source of surprise, more especially when the difficulties encountered are considered. This mine has been a perfect bonanza to the border Mexicans, who, regularly organized as gambrusinos, or mine robbers, have been for many years at their work of spoliation, here and elsewhere. It is well known that the town of Saric, in Sonora, has been built upon the proceeds of ore stolen from the Heintzelman mine. Before the revival of mining interests now in progress piles of ore, broken up ready for packing away, might have been seen, and the fresh tracks of mule-trains and wagon-wheels on the Saric would have shown how profitable this sort of enterprise must have been to the Sonoranians. The distances from Tubac by the road are as follows: To Revanton, 9 miles; Sopori, 5; Cerro Colorado, 11; total, 25 miles. A much shorter road could be made across the foot-hills of the Atacosa range of mountains, but the work would be attended by considerable expense.

Seven miles from the Cerro Colorado the Arivaca valley is reached, long celebrated for its rich mines and fine pastures.

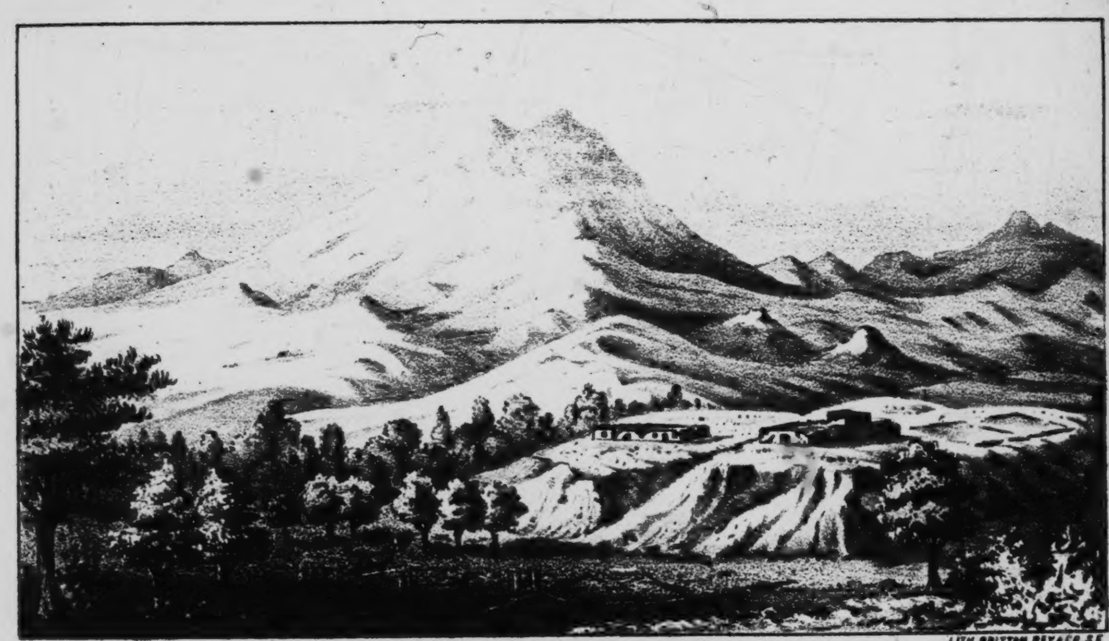
This valley and ranch, called by the Mexicans La Aribac, comprises within its boundaries 17,000 acres of agricultural land; twenty-five silver mines, formerly worked by the Mexicans, and numerous gold, copper, and lead mines, as yet undeveloped. It contains a large amount of rich meadow-land, bordering on a never-failing stream; is well wooded with oak, walnut, ash, cotton-wood, and mesquite, and is capable of sustaining a population of five or six thousand souls. The range for cattle and sheep is almost without limit, extending over a belt of grazing country as far south as the Arizuma Mountains, west to the great peak of the Baboquivari, and north and east into the heart of the neighboring mountains. This goes far beyond the boundaries of the ranch; but in Arizona, as in California, the possession of water has been considered tantamount to the possession of the whole surrounding country. The title was bought by the Arizona Mining Company, and is derived from Thomas and Ignacio Ortez, who perfected it as early as 1802; and is now claimed by Colonel Poston, as the purchaser of all that company's rights. It was surveyed by Lieutenant A. B. Gray, of the Boundary Commission, in 1859. Up to the abandonment of the territory, in 1861, it was in a progressive state of improvement, under the auspices of the company's agent. The reduction works of the Heintzelman mine were situated on this ranch for the convenience of wood, water, and pasturage, and were projected on a costly and extensive scale. A number of mines and locations have recently been made in this valley, and there can be no doubt of its prospective importance.

Among the most important settlements formed after the Gadsden purchase was that known as the Revanton Ranch, about nine miles north of Tubac, and forty south of Tucson. It is thus described in Browne's "Adventures in the Apache Country," under date of 1863: "It was at one time claimed and occupied by Elias Brevoort, who built upon it a fine adobe house, with a large corral and garden, at the crossing of the river, where the road takes off to Sopori and the Cerro Colorado. This palatial edifice occupies a square of several hundred varas, and is perhaps the largest and most imposing private residence in Arizona. Sixteen thousand dollars were expended in the building of the house and improvement of the premises. * * * The Revanton is now a ruin; the house is deserted—a death-like silence reigns over the premises. The grass is crisped, the trees are withered, the bed of the river is dry; the sap of life seems to have deserted the place with its inhabitants, and left nothing but ruin and decay to mark the spot. Yet a more beautiful region of country than that occupied by this ranch it would be hard to find anywhere. It is naturally rich in vegetation; the climate is unsurpassed; and during the season of rain, when the earth is clothed in verdure, it must be one of the loveliest spots in the world."

Under date of Santa Fé, New Mexico, November 3rd, 1877, Mr. Brevoort, who has resided there for some years, writes as follows: "I went from here in 1856 as sutler for the United States troops who were ordered to establish a military post upon the so-called Gadsden purchase. About 1859 I sold out my sutlership and went to reside at Revanton. About 1860 or '61 the troops were withdrawn from the territory, leaving many exposed settlements to the mercy of the Indians. This movement compelled many of us to break up, abandon our improvements, and leave the country. The Hacienda del Revanton was not covered by a Spanish grant, or in other words settled and claimed under a grant, but was held by pre-emption under the United States laws. In those days a Lieutenant Mowry (afterwards delegate) was reported as owning a Spanish grant which included Sopori and extended down the Santa Cruz some miles towards Tucson. In those unsettled days but few if any gave their attention to land grants in Arizona."

On the west side of the Santa Cruz, overlooking the valley and affording a magnificent view of Mount Wrightson, as will be seen by the illustration presented herewith, is the famous old ranch of Calabasas, of the buildings on which the ruins still exist. Mr. Bartlett, in his "Personal Narrative," makes the following reference to this location, as well as to the almost innumerable Spanish names that, so constantly heard, give one an idea of the country being more closely settled. Speaking of the old Spanish maps, he writes: "A stranger on looking at one of those maps would imagine the country thickly settled; whereas there might not be a village, rancho, or even a single inhabitant, where he is treated to a long list of names, including half the saints in the calendar, all the apostles, and the Holy Lady of Guadalupe into the bargain.

"This Calabasa, I was told by Leroux, was a thriving establishment when he visited it twenty years ago. A large tract of land was then under cultivation, and herds of cattle were reared on the adjacent hills. But the stream did not furnish a sufficient quantity of water to irrigate it, without cutting off entirely the towns of Tubac and Tucson; and consequently it was abandoned. This is the difficulty with these small watercourses; for having few or no tributaries to keep up the sup-



LITH. BRITTON, REY & CO. S.F.

MOUNT WRIGHTSON
from Calabaza, Santa Cruz Valley.

ply, as our northern streams have, and frequently running a course of several hundred miles before they terminate, their water cannot be drawn off without destroying the crops below them, and even depriving the people and animals of water to drink."

Below the Calabasas ranch the next point of interest will be the Oro Blanco mountains, and the important mining district—now a scene of active industry—located therein. The country west of this whole region requires separate detailed description. South of the Gila river, and west of Florence, Tucson, and the Santa Cruz valley, down to the Sonora line, is one of the most remarkable regions within the borders of the United States. A traveller who should undertake its exploration in the heat of summer, or without due preparation, would probably regard it as the wildest, most arid and desolate desert he ever passed over—if indeed he succeeded in passing over it at all. Within the indicated boundaries lies about one fourth of the territory of Arizona. It is not too much to say that it is, in many physical features, the most forbidding—let alone the least inviting—portion. Entering Arizona from Yuma, or east by the old El Paso stage route, one will see much territory that does not certainly altogether repel. The Gila valley, from Florence west, is closed in by more less rugged, black, volcanic ranges. On the south side, upon which the stage route is located, and over which the railroad, going east or coming west, must run, these ranges have been but little explored. Trails run southward from Gila City, twenty miles from Yuma; and to the east from Mission Camp Station, Mohawk, Burks, Texas Camp Stations, and one or two others, until the road reaches Florence. Raphael Pumpelly, mining engineer, who is one of the few Americans that have in part explored this region, says in his book "Across America and Asia," that "climatic influences have given a marked and peculiar feature to the vegetation of this part of the continent. Toward the Gulf of California the plains are barren and arid deserts, where the traveller may ride hundreds of miles without seeing other plants than dry and thorny cacti. Granite mountains bordering these deserts are even more awful in their barrenness; neither trees nor cacti, nor even a handful of earth can be seen on their sides; they tower high above the plains, great masses of white rocks, reflecting the rays of the sun with dazzling brilliancy."

Recent explorations and journeys as well as well-established facts greatly soften this severe judgment. Within the area referred to lies a country which until quite recently was the home of a large body of Indians—the Papagoes—and which contains also great mineral wealth. It is true that "Papagueria," as this region was called, became the home of that tribe because it was difficult of access and readily defended from Apache incursions; but the fact that it supported life for so long a period (there are authentic records showing well-populated Indian villages there at least three centuries since) shows that some portions must be adapted to the support of man. Papagueria, so far as its limits are known, occupies about one-third of the region under consideration, which is at least three hundred and twenty miles east and west from the Santa Cruz valley to the point where the Mexican boundary line touches the Colorado below Yuma. From Florence it will be about 290 miles east and west. From the Gila river to the Mexican line it runs from forty to one hundred and forty miles broad. The old Papago country lies in the central portion of this section. To reach it most readily, the traveler should go to Tucson *via* the Overland Pacific Company's stages from Yuma, and thence by private team or other mode to Sopori and Calabasas. Coming from Mexico the starting point will be Altar, Sonora, still the center of a large mining industry. All roads through Papagueria going south and all coming from Sonora north would meet and pass through the valley or broad intervale lying between the Baboquivari mountains west of Tubac and the Atascoso range that bounds the Santa Cruz valley on the west.

From Cababaos on the west side of the Santa Cruz the road into Papagueria and southward through the Papago ranch passes across the spurs of the Atascoso range, in which Mexican tradition locates the famous mine worked by the Jesuit fathers in connection with the mission of St. Joseph del Tumacacori. West of this range the traveler crosses south-westerly a high table land rolling westward, and covered by nutritious grasses, and the mesquite, ash, valverde, and some dwarf oak trees, as also the greasewood bush and innumerable specimens of the cacti. The sharp peak of the Baboquivari is in sight all day, its well-defined eagle-headed peak growing more distinct as the evening comes on apace. To either side of the Aliza Pass, with its welcome spring near the top, and the evidences of the Papagoes' former vigilance in watching and guarding it against the Apaches—evidences that the traveler will see in broken arrows, etc., scattered about—there are to be seen the long range, stretching wing-like to the north and south. The Baboquivari range enters Sonora for about one-third of its entire length. From the pass named a broad plain descends in a gentle slope to the center, widening to the north, and then swells to the west, rising gradually to the Quijota mountains, a distance of fifty miles or more. Across the plain or mesa thus described and located several trails pass and unite, from stations on the Gila river. The valley or intervale narrows as the ranges near and cross the Mexican line, and in this narrower part of the valley is located the famous Papago ranch. Above it, on thé broad plain, were formerly located the Papago villages. They are now nearly or quite all deserted. The famous Cabibi and Ajo mines, considered by Pumpelly, Colonel Poston, Herman Ehrenberg, and J. Ross Browne, who are the best known Americans by whom this region has been visited, as among the richest silver mines in the territory, lie some distance north of the Aliza Pass and the *Llanos des Flores*, as the plain crossed in coming from Cerro Colorado is called by the Mexicans. North and west of these mines are still other old and rich mines, the locations of which have passed from tradition, but which are known to one or two daring explorers. South and west of them lay the old Papago villages and wells —the latter generally located some distance from the village. The mesa is generally well covered with the black grama and other nutritious grasses of the region. The soil, could it be irrigated, would produce abundantly. At various points it has been under Papago cultivation. Water is obtainable at a moderate depth. Without doubt the soil holds the water which so readily sinks away into its loose and porous depth after the bi-yearly rains. The Papagoes have abandoned their villages and moved nearer to the reservation surrounding the mission church of San Xavier del Bac, about thirty miles south of Tucson. A few Mexicans are found yet in the ruined adobe hamlets of Fresnal, Cholla, Saguara, Tecolote, Santa Rosa, Saucito, Cojeta, Corral and Pirigua. In the eastern portion of the Papagueria the country is more thickly covered with a low growth of mesquite and palo-verde brush, above which looms a perfect forest of the columna saquara. East of the Baboquivari its character changes—plains are cut by deep valleys, with tributary cañons; mesas that are clothed with bunch and grama grass, with occasional mesquites. The valleys have a large growth of these trees. Cottonwood and ash are also found, and the hill-sides have live oaks and cedars to make them attractive. At the level of 6,000 feet pine begin to appear.

The ride from Aliza Pass to Cabibi, twenty miles, is over a gravelly plain. Thence south into Sonora is over an extensive, grass-covered table-land, brown and sere looking, but upon which cattle find nutritious food. The brilliant moonlight of this latitude and region making weird effects with the unfamiliar plants, and touching with silver the distant granite ranges and bleak volcanic peaks, makes a night ride over it one of the most startling pictures of travel. The dry atmosphere preserves animal matter from decomposition, and the carcasses abandoned by the road-side dry and shrink, but do not rot and moulder.

The notes or itinerary of a journey through the eastern portion of Papagueria, across the Papago Rancho, show the following facts: From Fresnal, an abandoned Mexican-Indian hamlet, which recent activity in prospecting is causing to be partially re-occupied, to the Papago Rancho, Sonora, is a distance of thirty-eight miles—the rancho being eight miles below the boundary line. The country is broken by the Baboquivari range, but all is fine grazing land. The Sonora Papago Rancho lies in a valley about twelve miles long, and from three to five broad. The soil is fine and the water good, with abundant grass. The old Hacienda is almost a ruin, having in past years been semi-deserted on account of Apaches. The mountains to the east and north-east show, on being prospected, fair traces of silver, with a little gold on the first plateau.

From the Mexican portion of what was once a connected grant to the Papago Rancho, in Arizona, is about twenty-three miles, by a road that was more used during the Apache raids, but only eighteen by the best and more open one. From Fresnal the Arizona rancho would be distant about twenty miles. The roads are generally over a country of fine grass. Coming from Sonora there is a bad strip about one-half a league wide, a sort of divide running from south-west to north-east, some three leagues long. Above this, the valley in which the Arizona Papago Rancho lies opens out beautifully. At the lower end it is about one and a half leagues across, protected by low-lying spurs to the west and south-west, and further back by a well-defined mountain range. The altitude must be about two thousand feet above sea level. This valley is very fertile, but has long been out of cultivation. The place is now deserted. Remains of former cultivation are apparent to the north of the old hacienda ruins, and on the eastern side of the valley. Wild oats and other grain are found growing about the old corral. There are several wells here, and at the time of the visit described these were nearly full; that is, to within four or five feet of the surface. These were designed for stock, if the small stream that passes through the valley should fail, or Apaches surrounded the hacienda. All along this road, through the valley and in the two valleys east of it to the famous Ajo copper mines to the north-west, as also on the *Llanos des Flores* to the north-east, wells are sunk—a work evidently done at least one hundred years ago, and probably under the direction of the Jesuits, who had control of the Papagoes. Remains of ditches, and in three places a connected drain or canal, are to be found, proving that water was more than abundant. In the walls of the old corral, and also in those of an adobe shed, were found sugar-cane stalks embedded in the clay just under the roof timber, proving that cane must have been grown at this point. There are still to be seen ruins of a mission or mission depot about half a league to the northward of the old hacienda. The valley could itself support a large population, and must ere long be again brought under cultivation, as the increasing activity of mining interests will demand that this should be done. It is probably the finest site for an agricultural and pastoral colony to be found in the whole Gadsden purchase. Thousands of cattle could be fed here all the year round. It probably fed in the old days of the Spanish rule one-half at least of the Pimeria Alta, as the country between Altar and the Gila river, in the Intendancy of Sonora, was called. It is the opinion of the few Americans who know this region thoroughly that beeves and grain were sent from the Papago Rancho valley, here described, to the missions south even of Altar, and also to the great chain that extended west and south-west to the Gulf of California—the sea of Cortez, as it was once termed. The region, though now utterly desolate, still forms an oasis in the midst of the gravelly, arid mesas and volcanic plains amid which, to the north and west, it is set like a gem.

There are abundant evidences of minerals in the neighboring ranges, and some proofs of old workings also. Forty miles north are the old Ortega mines. The road passes mostly through a broad valley, but higher and dryer than that in which the Papago hacienda is situated. It is excellent, however, for stock. The Mexicans have used these roads for many generations. The famous Ajo copper mines lie to the north-west, nearly 100 miles. Through the valley, which might perhaps with propriety be named the Baboquivari, from the mountain range to the east, which forms its boundary on that side, must pass a great traffic. Passing directly west of it, the country everywhere grows wilder, and the trials are dangerous to man and beast, owing to the arid desert over which, from San Domingo on the Sonora line to Gila city, near Yuma, on that river, they pass. Grass is poor and water often very insufficient, with long stretches without any being found.

Very few Americans have crossed this inhospitable and arid region. It has often been penetrated, but seldom traversed. The Mexicans of the border, *gambrusinos*, robbers of the miners, are not unfrequent visitors thereto. Since Pumpelly's journey in 1861, the region under review has been lonelier than ever. Pumpelly's route to the Gila, and thence "inside," was to the west of the Papago villages. These he visited in company with Colonel Poston and Mr. Washburn, both connected then with the mining enterprise in whose employ as engineer Mr. Pumpelly was at the time. The evidences of comparatively recent volcanic activity are not confined to the northern portion of the territory. The entire breadth of the Papagueria plateau is traversed by regular lava beds, and long, low ranges of cones, down the mouths of which the traveler almost looks.

CHAPTER IX.

THE BABACOMORI AND EAST.

East to Apache Pass. South from the Overland Road. The Cienaga. Camp Crittenden. Camp Wallen and the Babacomori Ranch. Camp Huachuca and Mountain. The Dragoon Spring Route. The Chiricahuas. The Arivaipa Canon, etc.

The region to the east and south-east of Tucson is not widely known, though portions of it have been continually travelled by the overland stages before the secession war, and since the more permanent reopening of the Territory, consequent upon the reduction of the Apaches.

The country between Tucson and the Apache Pass, except that portion of the Cienaga over which the traveller passes before reaching the San Pedro, is decidedly uninteresting and dreary. The landscape, though on a huge scale, has a marked similarity. The peaks of the Santa Rita are purple in the glowing southern distance. The rugged, bare San Catalinas are gray and bald in the hazy west. The wondrous tones of the haze that rests on the far outlines form a deep contrast to the gray alkali plain, whose dust flies around the craunching wheels of the stage, and the burning sky above, if the journey be made in summer time. To the right the eastward-bound traveller lets his eye fall upon the Chiricahua peaks, and the bold front of the Three Sisters, while far beyond a faint blue line marks the outlines of the San Ignatio range, in Sonora.

Leaving the stage route, and turning south before reaching the San Pedro, the traveller will find himself on a wide grass plain or cienaga. By this route he will reach Camps Crittenden and Wallen, and thus get to the center of one of the best grazing sections of the Territory. He will strike due south across to Davidson's springs—a point on the extreme northern portion of the Santa Rita range, ten or twelve miles below where the overland road crosses a pass between the Santa Catarina mountains and the more famous range to the south. Passing across a high rolling plain, between the northern wing of the Santa Ritas and the broken formation to the eastward, known as the Whetstone mountains, the prospector will find it covered with nutritious grasses, not so brown and sere looking as the black grama and other indigenous grasses, but showing evidences of a heavier rainfall than elsewhere. East of the Whetstone range is the valley of the Rio San Pedro, which at some forty miles below and east of Davidson's, divides into three branches, one of which is known as Babocomori creek. The Dragoon mountains, a very bold and striking range, form the eastern boundary of the San Pedro valley. This valley already forms an important center of settlement. In the portion nearest the overland road there are several thousand acres under cultivation. New mining interests have also been started, and are now being worked. The road being described shows evidences of a more abundant waterfall than is usual elsewhere in Arizona. In fact, the region forms the center of a rain-belt, fed by currents from the Gulf of California, the western boundary of which is near the Santa Cruz valley, a few miles from the Tyndall and Aztec mining districts, while its eastern line touches the Dragoon mountains. In this belt the rainfall is equal to twenty-four inches yearly.

Proceeding up the Davidson cañon, so called after one of the pioneers killed some years since by Apaches, the traveler will in about fifteen miles cross the divide and arrive at Fish's ranch. Here Hyslop & Vail have a stock ranch; thousands of acres of most magnificent grass land, a spring of water near the house, unfailing and sufficient for thousands of head of stock. The house is one of the best adobes in the valley. Fish, the former owner, is now one of the owners of the famous Patagonia or Mowry mine. So far, all has been grazing country; at least, grass seems to pay better than anything else, and the herds of cattle, with a good sprinkling of mules and horses, indicate a prosperous business to the stock raiser. It is a ride of a dozen miles to old Camp Crittenden, laid out on a hill, from which we can look down on the ruins of old Fort Buchanan. Camp Crittenden is only a fort in name, and though the walls of the houses are still fairly preserved, the roofs have long since fallen in. It is now a useless ruin, although the buildings and Reservation are still in charge of Mr. S. Hughes, of Tucson. There have been no troops here since 1867. The last raid of the Apaches began April 15th, 1877, and several men were killed; but the renegades were finally driven off, since which time the Sonoita valley has not heard a war-whoop. Fine crops of wheat, barley and corn have been raised here, and at Morgan's ranch, which is the next one met with. After crossing the high grassy plain already described, and on which countless herds can be nearly always fed, as water is obtainable in shallow wells and tanks, the traveler will take a south-westerly course for about twenty miles to Camp Wallen, a deserted military position established by the California volunteers who were stationed in this region in 1863–4. A few miles to the north-west, near a trail going in that direction, are the now abandoned San Pedro gold mines, still regarded by many as very rich. To the south and west of Camp Wallen, probably twenty miles or so, are the famous galena mines formerly worked by Sylvester Mowry, known as the Patagonia or Mowry mines. The Huachuca mountains are seen from Wallen in this direction, and still beyond lies the Patagonia range. Camp Crittenden, already described, lies a score of miles to the west of Camp Wallen.

The whole region thus outlined is well supplied with grass and timber, while water is generally ample and could be made permanent by a little labor and engineering skill. The eastern slopes of the Santa Ritas, especially on the south, are covered by white and yellow pine, with considerable dwarf oak and cedar also. The Tubac road passes through the well-known dry placer region, in which a number of men have been successfully at work for some time.

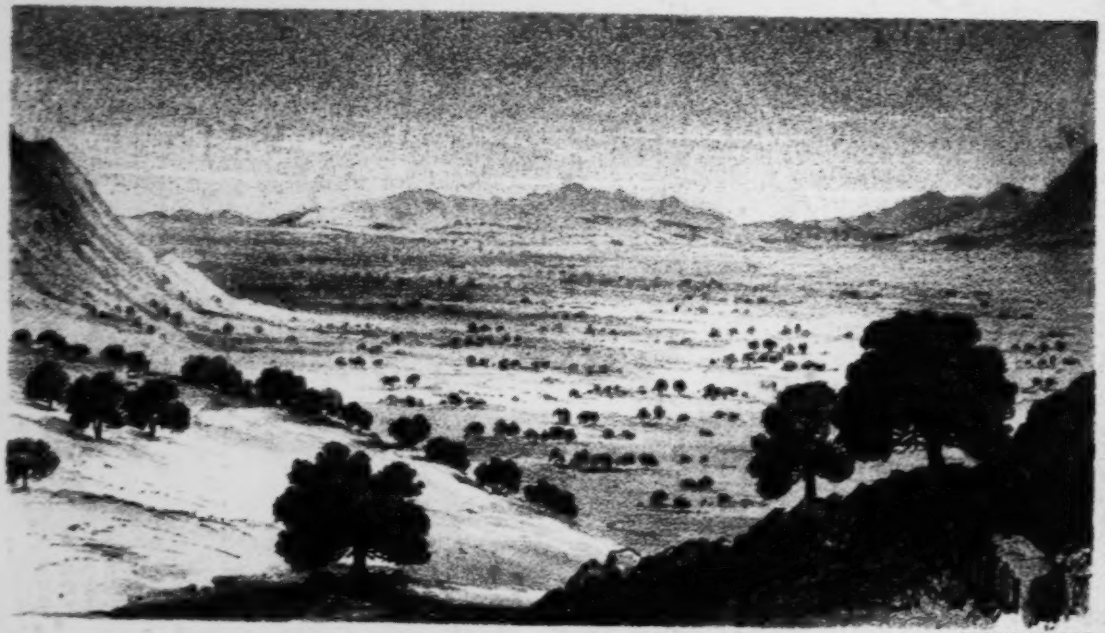
A correspondent of the Prescott *Miner* recently described this region. He is engaged as a scout with the military, who have occupied a temporary post in the Huachuca mountains, a few miles from the Sonora line. Speaking of the cienaga or grassy intervale which is passed over in traveling south from the Overland Road, the correspondent says:

"Here in a pleasant valley, with plenty of water and grass, we found one man farming on a very limited scale. This valley up with us would be considered sufficient for a large settlement. Good grass is in abundance on every hand. We traveled up this valley seven or eight miles and struck another cienaga, plenty of water all the way, and a very fine farming country. We did not march to the end of this valley. I have no idea how far it extended. I inquired of our guide how many settlers there were, and he said there was only one man with some cattle.

"We left this valley and scouted in Whetstone mountains. We found good grazing on all of the foot-hills, although this was the dry season of the year. There are plenty of good stock ranges unoccupied and unclaimed. After passing to the other side of the Whetstone mountains we struck the valley of the Babacomori creek, and fine grass all along. The Babacomori is said to be an ancient Spanish grant. The McGarey brothers have a ranch on the creek about seven miles above old Camp Wallen, but they are not farming to amount to anything, being principally engaged in sheep and cattle raising. * * The Babacomori is twenty-five miles long from its source to its junction with the San Pedro, and flows east through a fine valley, with plenty of water all the way, and in places large cienagas. I have been down the San Pedro twelve miles below the mouth of the Babacomori creek, and up the San Pedro to its head in Sonora and on all its tributaries. It is impossible for me to estimate the number of settlers that could find valuable farming land and stock ranches on this river. We can boast of no such valley up north. There is some talk about this valley being covered by Spanish grants; but whether it is this or the depredations of Indians that has kept this valley from being settled, I know not; but to me, having come here for the express purpose of hunting Indians, and not having seen even a track of a hostile, it seems as if the Spanish grants must have been the cause. However, a small settlement has already sprung up on the San Pedro, about twenty miles from this camp, and bids fair to thrive and grow into a large settlement soon. But this leaves miles and miles of good farming and grazing lands along the banks of the San Pedro, only waiting for the plow to bring forth crops equal to any produced in Arizona. There are several fine valleys leading east from the Huachuca mountains to the San Pedro—several cienagas, all of which are as good locations as are to be found. There are very fine stock ranges in Huachuca, Dragoon, and Whetstone mountains, and in fact this whole country is one vast stock range."

The view of the Santa Rita mountains, obtained from Camp Wallen or the vicinity, offers one of the most magnificent of mountain scenes. The bold and picturesque lines are perfect and unbroken. Though bold and rugged, they are not precipitous or jagged, while such is the mildness of the climate that, though their summits are at least 10,000 feet above sea level, the grasses grow to the very top, and stalwart pines are found where the brow touches horizon lines. The valley in which one travels resembles an old and cultivated tract, while the more rugged portions show the existence of abundant moisture by the huge cotton-woods on every hand.

The Camp Wallen buildings are located on what is known as the Babacomori Ranch, and the land on which they stand



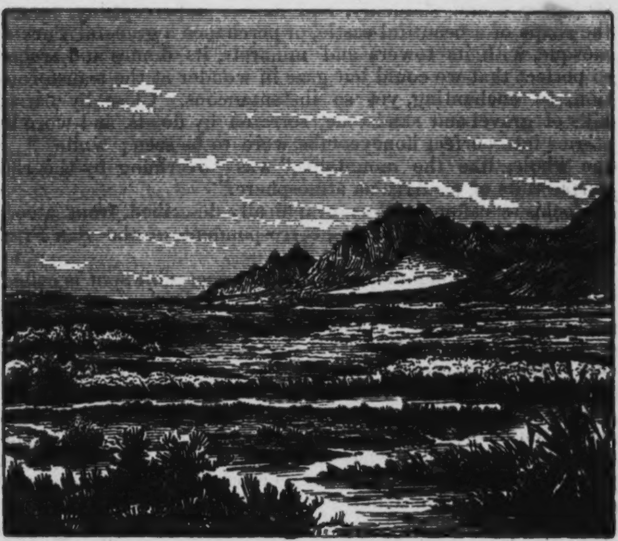
VALLEY of SANTA CRUZ
from Santa Ritas!

forms part of a Spanish land grant of 85,000 acres, which comprises the most valuable of the few such tracts that are likely to be recognized as valid. It embraces the western branch of the Rio San Pedro, the Rio Babacomori, a beautiful valley not over half a mile wide, (which will make capital agricultural land by the aid of slight ditching) in the midst of a broad rolling plain or mesa abundantly covered by nutritious and luxuriant grasses. The stream is clear, about twenty feet wide and two feet deep, and contains an abundance of water the year round for all purposes—so at least declare the stockmen. Its banks have quite an abundant supply of cotton-wood and the Spanish willow trees. The old quarters at Camp Wallen are now occupied by the Messrs. McGarey, who have at least 7,000 sheep on the ranch. There can be no finer place in Arizona for a sheep and stock ranch—or, still better, for the location of a farming and grazing colony. Grain can be raised in abundance, and fruit also. The neighboring mountains to the east have not shown any marked mineral indications, but to the west there is no question whatever that one of the richest mineral regions of the continent centers in the Santa Ritas. There are abundant evidences, moreover, of dry placers near by. The ranch is about eighty miles from Tucson, about sixty from Tubac, and sixteen from the Tyndall and Aztec districts. The value of this grant as the site of a prosperous colony can be readily appreciated. The valley is sure to prove one of the very best regions in the territory for farming and stock raising. The climate is quite temperate for its semi-tropical position. This is due probably to the altitude, which must be at least 4,000 feet above sea level. All the fruits, temperate and tropical, could be produced with ease in the valley, as well as grain and vegetables. The cost of irrigation would be comparatively small, and the result abundant. There is not a large amount of timber, which is chiefly mesquite, dwarf oaks, cedars, and a few pine. The cactus is not abundant, and the general aspect is changed from that presented elsewhere in Arizona. The mountains afford good grazing to their very summits.

This whole region, including the Babacomori valley, and the other two branches of the San Pedro, affords ample room for large settlements, and the certainty that the Santa Rita mountains must have in them at an early day a large mining force, insures that such occupation will be profitable. Labor is cheap and ample, as the vicinity of Sonora assures that; and the probabilities are strong that, if mining development continues as rapidly as may now be reasonably expected, a railroad as well as telegraph line will ere long pass through the Rio Santa Cruz valley, some thirty miles distant, connecting Guaymas on the Gulf of California and Tucson, Arizona, and at that point uniting with roads east and west, as well probably as one to the north-west also belonging to the Union Pacific. Other correspondents, besides the one already quoted, give some further account of the country next to the Sonora line: "After leaving Morgan's, we scouted rolling foot-hills and mountains to Mowry mine; fine grazing country all the way, and nothing in northern Arizona to be compared with it in extent. The hills are not too steep, and there is plenty of water in springs and cienagas. From the Mowry mine we scouted to and across the Mexican line into Sonora. We scouted around the southern base of the Huachuca mountains—this portion of country it is needless to describe, as it is (at present) outside our jurisdiction. This country is much better for farming and cattle raising than we have heretofore given it credit for, and there is land sufficient for farming and grazing for many an emigrant." Of Camp Huachuca and vicinity, it is reported that the country is rapidly settling up for miles around the point where the troops are stationed. The military have a garden down at old Camp Wallen where they produce vegetables for the camp. Everything grows not only very large, but with wonderful rapidity, and is unexcelled in delicacy of flavor by similar productions elsewhere. Beets and carrots root down over two feet, and the corn grows so high there that it is not unusual to find stalks where the ears are from six to seven feet from the ground. The surrounding mountains are full of mineral. Several very rich discoveries have just been made, both in the Huachuca and Mule mountains. One lead shows over seventy per cent. copper, and is very rich in silver. There are traces of several old mines which have been worked, but prospectors are taking hold of new discoveries. Here nature has placed side by side one of the richest valleys and mineral producing belts in the Territory, so that the miner and farmer may walk hand in hand."

Returning northward to Camp Crittenden, and then eastward through to the Chiricahua Reservation, the road to Dragoon springs has been described by stray travellers, notably by Mr. Bartlett, as of an uninviting character. The San Pedro is spoken of as being at the point of crossing a "sandy barren and destitute of timber. The river banks have not a shrub growing upon them, and you come right upon the deep, swift, muddy little stream without being aware of your approach."

Above and below this section, however, the San Pedro valley bears a better character. There is a growing settlement near where the stage road crosses at Tres Alamos, and that trading point is becoming one of importance. A territorial paper says: "At Oak Grove, about eight miles from Point of Mountain beyond Tres Alamos, the White Bros. have dug a well twelve feet deep, and at that depth a stream of water comes pouring in. They have sent to California for a wind-mill, by which means they will raise water for many thousand head of cattle.



CHIRICAHUA MOUNTAINS.

Nearly every year abundance of water is found on the surface, and to get a supply so near the surface this year is a guarantee that their ranch site was well chosen; and further suggests the probability of getting plenty of water in many places by digging even shallow wells. The south-eastern part of the Territory is covered with pasturage, and in many places water can be found in brooks and springs almost every year, which argues that not very much digging would be required to get water in the driest seasons. The valleys between the Dragoon and

Chiricahua mountains and between the Chiricahuas and Stein's Peak range, evidently contain abundance of water very near the surface."

Mr. Cozzens describes the pictorial aspect of the region as follows: "The huge rough and jagged peaks that towered around us were toned and softened by the purple haze that enshrouded them into perfect models of architectural beauty. Here an apparently impregnable fortress, standing high in the air, with its frowning battlements, grand in their massive strength, would suddenly, and almost imperceptibly, assume the shape of a beautiful castle, or perchance a graceful Turkish mosque, with its towers and minarets, its domes and arches, so perfect that we could but gaze in wonder at the transformation, so enchanting, yet so instantaneous. Close by barren hills of gravel and sandstone, serrated by floods, and worn by storms into perfect honeycombs, were to be seen; while * * the whole, like the mountains," was "overhung by the rich purple tints of an Arizona atmosphere."

Cochise's cañon is thus graphically described, from a very recent visit, by Mr. Roberts, correspondent of the San Francisco *Morning Call:*

"Cochise's stronghold, as this barely accessible spot is called, is situated near the northern end of the Dragoon mountains, and extends through this range from the Sulphur Spring valley to that of the San Pedro. It is a craggy break, whose bold and rugged aperture strikes the eye from the summit of the Chiricahua mountains, fifty miles away, and which increases in unevenness and asperity as the traveller approaches it. We had often heard from some of the scouts that a visit to this cañon would amply repay the admirer of wild and weird scenery; but as the trail to the more extreme southern portion of the Territory does not lie through this pass, and as there seemed to be serious doubts as to the possibility of striking water in the stronghold, we should have undoubtedly passed it by, had not a lucky circumstance induced us to change our proposed route. At Camp Bowie we happened to meet Lieutenant Robert Hanna, of the Sixth Cavalry, with a company of Indian scouts, on his way to the Huachuca mountains. As we were wending our way in the same direction, and as there is always a certain sense of security in traveling under the ægis of the stars and stripes, we very gladly accepted the Lieutenant's proffered hospitality, and "for the second time in life enlisted in the line." Lieutenant Hanna being in a hurry—which we find is a peculiarity of United States officers—

thought he would take the shortest cut across the Dragoon mountains, and decided upon attempting a passage through Cochise's cañon, water or no water. Every one immediately assented, and was glad even to risk the possibility of a dry camp to be afforded a view of the grandest scenery in southern Arizona. We accordingly broke up camp at daylight, and hurrying across the Sulphur Spring valley, reached the mouth of the cañon at noon. A beautiful grove of live oaks lures you into the more inaccessible portion of the cañon, and if you have faith in maps you will see—on the map—a beautiful spring, which bears the name of Cochise Spring. The dried-up water-hole was there, but, from its geological appearance, we would be willing to assert that the fountain's source had given out long ere the youthful Cochise romped in childish sport on the verdant carpet before us, or practised with his little bow on lizards and pee-wees. Through this beautiful woodland scenery an old Indian trail winds slowly up a gentle acclivity, and taking an abrupt turn, brings you suddenly to the mouth of the cañon, which, owing to the proximity of its sides, and an arched tendency in the rocks above, reminds you forcibly of Dante's dark entrance to the Inferno, and you unwittingly look above for the lines in which an invitation was extended to the visitor to leave all hope behind. One looks appalled at this pass as a strategetical position, and cannot help thinking of the reckless bravery that must have characterized our countrymen who dared to track Cochise to his lair, and venture within the range of his rifle.

"Every rock is a redoubt, every bowlder a fortress, from behind which the murderous Apache could hurl defiantly his primitive means of destruction, as well as the more modern one learned from constant warfare with the whites, and from which at the least wavering sign on the part of the assailant he could at his chieftain's bidding dash out and ply the scalping knife to his heart's content. Layers of ascending rocks, still more precipitous and ragged, form a series of safer retreats in case of need; but we doubt if ever they were used, save against inimical Indians, who may have fought the Apache in his own peculiar mode. A small and narrow passage, barely wide enough for a pack mule, winds its tortuous way through this second stronghold, and finally opens into a sort of basin, surrounded by nobler peaks, which bear a luxuriant vegetation. We found the trail impassable in many places, owing to the fact that it has not been traveled for years, and was consequently obstructed by brush and the projecting limbs of trees; but a passage was soon cut through by our Indian scouts, and we managed to squeeze through at the expense of some of our outer garments, and an occasional refusal to proceed on the part of our mules. In this basin lies the bed of a creek, through which, in ordinary seasons, a lively stream must undoubtedly flow; but owing to the extraordinary drought which has visited the Pacific Coast during the past year, the creek was as dry as the travelers, and with a "same old story" muttered around, we gave our mules a spurring invitation to climb the mountain in front of us. Halting on the other side, we stopped in an immense rocky cavity, from which a beautiful view of the Sulphur Springs valley below us could be had through a sort of lunette about twenty feet wide. The rocks seemed to have been placed by a natural convulsion into an oval frame of the dimensions above given, through which the eye could gaze miles around into the valleys, and from which, undoubtedly, the Apache videttes watched the approach of the Mexican trains on their way to the more northern portion of the Territory. Our command tarried here quite a while, so enchanting was the contrast between the cragginess around us and the smooth undulation of the valley beyond. For a mile or so further the scenery partakes of no peculiar feature until the painted rocks are reached at the southwestern mouth of the cañon, as it opens into the San Pedro valley. The few rays of the setting sun that can penetrate the cañon were just tinging the tops of this peculiar formation, and brought out conspicuously the metallic colors which permeate these rocks in a multitude of crossing and recrossing filons, the whole presenting a picturesqueness seldom to be found among the freaks of nature. At the base of these painted rocks we found water in sufficient quantity to supply the wants of men and beasts, and immediately made the necessary preparations to camp there that night.

"The most interesting feature of our trip is now to be told. Indian nature, from time immemorial, has always been noted for the superstitious element which pervades its character. They are perfect children in that respect. They have their bug-a-boos, their good and evil spirits, their perennial appearances of ghosts, and their medicine man, who seems to exercise a general superintendency over the supernatural. One of their beliefs concerning the translation of the spirit into another world is, that the soul ascends with the smoke of the funeral pyre, and is wafted to a cave. Sometimes the spirit of the deceased enters the body of a coyote, or a nobler animal, according to his rank; but judging from the number of coyotes in

Arizona, we are led to believe that the plebeian element preponderates largely among the Apache tribes, and that the "big chiefs" are few in number. Sometimes it so far materializes itself as to be seen by the medicine man. This is looked upon as a good omen, and portends a successful hunt or a bountiful crop of Mexican ponies to be hereafter stolen from the valleys of Sonora. The entrance to the cave is generally supposed to be guarded by an immense toad or a serpent.

"During the course of the evening, and while seated around our fires, pell-mell with the red-skins, our conversation turned upon Cochise and his probable place of burial, which is supposed to be in this cañon. We naturally sought the information from one of our Indians, who spoke English passably, and who insinuated that, although he did not know where the great chief was inhumed, the medicine man could, nevertheless, show us a cave, not far distant, which Cochise's spirit had selected for its abiding-place, and where at times he appeared to his countrymen, and advised them regarding their intended actions and movements. One of the brave men of the party immediately contracted with the medicine man to show us to the grave for half a plug of tobacco, and slinging our Spencer carbines over our shoulders, five told him to proceed, and we would follow. Taking a torch in his hand, he led us back into the gulch, three or four Indians following us. After traveling a few hundred yards, we suddenly came to a fissure on the right hand side of the mountain large enough to allow the passage of a human being, and into it he directed his steps, the flickering light emitted from his mesquite torch throwing a lurid glimmer upon the rocks around. This fissure opened gradually into a cave about fifty feet in circumference, and barely of sufficient height to allow us to stand without slightly stooping. Planting his torch in the middle of the cave, he motioned us to stand back against the wall, and forming with his companions a circle around the torch, commenced a mournful incantation, the principal words of which seemed to be "Hum hoo yay!" whatever that may have meant in the Apache dialect. After singing a few verses they began walking around the torch, and finally started into a little dog-trot, their utterances increasing in rapidity with their perambulation around the fire. A sudden "Hugh!" from the medicine man caused us to start, and direct our attention toward the side of the cave, to which he kept pointing, and uttering uncouth sounds, with a volubility and sharpness that was deafening, while the remainder of the Indians kept their heads bowed down, as it were, in a timid and respectful attitude. We immediately understood that the spirit of the great Apache warrior was in our midst, and with a bold attempt at averting a slight shudder, strained our eyes into the darkness beyond, to catch a glimpse of the apparition, which seemed to have thrown our medicine man into a frenzied state, which could barely be termed human. But in vain did we gaze. To the unbelieving Californian, Cochise showeth himself not. It is only to his faithful descendants that he deigns to appear in this semi-ethereal form, to depart again and "revisit the glimpses of the moon." Suddenly our medicine man uttered a piercing cry and fell to the ground in a sort of convulsive stupor. The incantation was over, the spirit had vanished, but the terrible strain had had its effect, and the conjurer lay prostrate on the floor. A few minutes sufficed for him to recuperate; and taking up his torch, he led us back to the open air without uttering a word, a cold perspiration moistening our brows. The cool air of the night was a pleasant substitute for the smoky atmosphere of the cave, and having supped full of horrors we returned to camp, and rolled ourselves up in our blankets to dream of Cochise.

"The next day, on the way from the cañon to old Santa Cruz, our Indians killed twelve deer, and showed them to us with a triumphant smile at our skepticism in disbelieving the power of their regretted chief."

One of the peculiar features of the extreme eastern part of the region under consideration is an extensive deposit known as the Soda Lake, which is reported as 150 miles in circumference. It is certain at no distant day to become of commercial value, and will not then prove as now, a mere illusion to betray by the mirage that constantly arises in the morning, the inexperienced traveler. It has been described thus:

"There it was, sparkling and beautiful in the bright sunshine, with its white-capped waves lapping the shores, skirted by a light growth of forest trees, its deep blue waters affording a refreshing relief from the dusty plain and glaring sunlight—a very Will-o'-the-Wisp to the weary, thirsty traveler."

The north-eastern portion of Pima County is of an interesting character. Descriptions of Camps Bowie and Grant will be found elsewhere. The Arivaipa valley and cañon are likely to be the center of a considerable mining industry.

The town of Safford, a small but growing place, is to be found here, and Camp Thomas is situated on the Gila river, at a point about thirty-five miles from Camp Grant, A. T., by the nearest of several roads. The climate there (except in midsummer) is delightful; water abundant and good, both in river and many springs; wood plenty in large cottonwood groves along the valleys; location very healthy; instances of sickness exceptional, and not severe; population, in the immediate vicinity, about 365. Land is fertile and rich, and being settled by an intelligent and industrious population; rich mines being constantly discovered, and many in course of development; scenery beautiful; the town is laid out with the customary plaza; business houses on the east and west sides, and dwellings on the north and south sides; the streets are wide, nicely graded, and shaded on either side with double rows of tall cottonwoods. There are valuable hot springs in the vicinity, within six miles, which possess medicinal qualities. The elevation is about 3,000 feet above sea level.

The Arivaipa cañon has its head about thirty miles northwest of Camp Grant, and twenty-five miles south of San Carlos, and is about thirty miles in length to its junction with the San Pedro river and valley. The upper twenty miles is a deep, wild gorge, with steep and abrupt cliffs on both sides of from 400 to 1,000 feet in height, reaching back to a height of 2,000 feet. The cañon has been cut out by running water in the long ages which have passed away, since the deposition of a drift that is plainly to be seen is mostly a conglomerate. The whole upper part of the cañon is a cemented conglomerate, and the lower part a sandstone conglomerate. The face of the cliffs, the angles, the side-cañons, the jutting and overhanging cliffs, are worn into all sorts of fantastic forms, such as forts, towers, churches, houses, thrones, pulpits, etc., which meet the eye at every turn for miles. At many points in this valley are the stone foundation walls of old ruins, surrounded by the same mystery attending similar remains so freely scattered throughout the territory. The future of this region seems to be now assured.

CHAPTER X.

THE TOWNS OF ARIZONA.

Historical Sketches of Yuma, Ehrenberg, Prescott, Florence, Tucson, Wickenburg, Phœnix. Their Population, Trade, and Surroundings. The Towns of Mojave County. Mining Camps. Mineral Park. Cerbat. New Virginia City. Signal, etc. A General Review. Wages. Cost of Living. Merchants. Importance, etc.

In the year 1700 Father Kino established a mission on the spot now occupied by the post of Fort Yuma, upon the California side of the Colorado river, but it was soon afterwards destroyed by the natives, who, however, seem to have been well let alone until 1771, when Father Garces visited the Colorado river, and subsequently, in 1778, with others, established two missions—one at the intersection of the Gila and Colorado, on the site of Fort Yuma, and another nine miles below, on the same bank. In 1781 the horses of a score of soldiers there stationed did some damage to the crops of the natives, who thought there was insufficient alertness in making good the damage; and on Sunday, July 17th, when the soldiers and 150 Spanish people were nearly all at mass, the Indians took advantage of their piety to send the men where they would have an opportunity to secure its reward, taking away the women and children as captives. It does not appear that any further efforts were made by the Spaniards to occupy this region; and although a Catholic missionary had explored and described it, and compiled vocabularies of the Yuma and Mojave languages, it was not until Gen. Phil. Kearney marched his command through the Gila valley in 1847, during the war with Mexico, that something of the country began to be known to Americans. The gold discoveries in California following closely on the American acquisition of territory, attracted immigrants to the Pacific coast. The thirty-second parallel route, never impeded by snow, was seen to have great advantages over the northern route. The difficulty of crossing the Colorado was obviated in 1849 by the establishment of a ferry by Dr. Lincoln and others, near the present site of Yuma, the

Indians of which tribe were at first friendly; but partial hostilities soon grew out of petty thefts by them, and summary reprisals by the emigrants. The difficulties might perhaps have been settled but for the arrival of John Glanton with a party of Texans. These men had been previously engaged scalping Apache Indians, under contract with the governments of Chihuahua and Sonora, but are said to have been rather too impartial in their selections of human material, not caring what races or tribes the scalps came from, provided the disbursing officers could be satisfied. This disposition to ignore the "color line" having rendered them unpopular in Mexico, they came to Yuma, and went into partnership with Dr. Lincoln in the business of ferriage; but not satisfied with the liberal profits thus accruing, they added to it the robbery and murder of emigrants, which they attributed to the Yuma Indians; then Glanton killed a man employed by the Indians to run an opposition ferry, which caused an outbreak that resulted in the killing of all except three persons; among the slain were Glanton and Dr. Lincoln. On July 11th, 1850, Don D. Jaeger, Benjamin Hartshorne and others arrived from California, and again started the ferry, over which sixty thousand people crossed in the fall and spring of 1850–51. On this occasion the lumber for the ferry-boat was brought with the greatest difficulty across the desert from San Diego, and the ferry was established at Pilot Knob, near where Hanlon's ferry is now run. They made money until November, 1851, when the ferry-men were attacked and driven off by the Yuma Indians, the troops from the post having been withdrawn, all but six men. In June they had to move down to a stockade built by the ferry-men near Pilot Knob; and in November the whole party of soldiers and ferry-men retreated to San Diego, abandoning the Colorado river to its savage proprietors. In forcing their way out, Jaeger was shot through the arm with two arrows, and under the ear with another, which pierced his head through to under the opposite ear; but he made good his escape with $600 in gold.

Many Mexicans in Southern California who were not reconciled to the results of the Mexican War, instigated a coalition among the Indian tribes to clean out the American settlers and ranches, from the Colorado river as far up as Santa Barbara, which necessitated the re-establishment of Fort Yuma; and in the Spring of 1852, Heintzelman and Stoneman, (who both afterwards became famous in the civil war, the latter having subsequently commanded the Department of Arizona) marched across the Colorado desert with six companies for that purpose, and after a terrible time in crossing, from rain and snow in the mountains, reached the present post of Yuma. At that time Wilcox reached the mouth of the Colorado in a sailing vessel with troops and supplies from San Francisco; the troops were commanded by Lieut. Derby, ("Phœnix") better known as a wit than a soldier. Our ferry-men came back, and again turned a tide of emigrants over this route. The Indians, however, maintained an active warfare until conquered in February, 1853, when, under the protection of the Fort, the village of Colorado City arose. It was afterwards designated "Arizona City," and finally included in Yuma. But it was not until the Gadsden purchase in 1854 that the present site of Yuma was included within the limits of the United States, previous to which purchase all of the territory south of the Gila belonged to Mexico.

Professor Pumpelly described Yuma in 1861, as follows: *"This place, consisting of one house, had a curious origin, which was told to me by a friend† who was also the founder. Soon after the purchase of Arizona, my friend had organized a party and explored the new region. Wishing to raise capital in California to work a valuable mine, he was returning hither‡ with his party, when they reached Colorado river at this point. The ferry belonged to a German, whose fares for the party would have amounted to about $25. Having no money, they encamped near the ferry to hold a council over this unexpected turn of affairs, when my friend, with the ready wit of an explorer, hit upon the expedient of paying the ferriage in city lots. Setting the engineer§ of the party, and under him the whole force, at work with the instruments, amid a great display of signal-staffs, they soon had the city laid out in squares and streets, and represented in due form on an elaborate map, not forgetting water-lots and a steam ferry. Attracted by the unusual proceedings, the owner of the ferry crossed the river, and began to interrogate the busy surveyors, by whom he was referred to my friend. On learning from that gentleman that a city was being founded so near to his own land, the German became interested; and as the great future of the place was unfolded in glowing terms, and the necessity of a steam ferry for the increasing trade dwelt upon, he became enthusiastic and began negotiations for several lots. The

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* "Across America and Asia," page 60.
† Col. C. D. Poston.
‡ In 1854 or 1855.
§ Herman Ehrenberg.

result was the sale of a small part of the embryo city, and the transportation of the whole party over in part payment for one lot."

The ferry-man was the well-known Don Diego Jæger. J. Ross Browne described him in his pleasantest vein in 1863, as follows: "A German by birth, a frontiers-man by instinct, Don Diego abandoned the haunts of civilization fourteen years ago and settled here among the savages. Many a hard rub has he had for his life during the years of trouble with the Yumas. Industry, energy, and perseverance prevailed over all difficulties; and in time prosperity rewarded his trials. * * When the burning suns of the Colorado wilted every other man down to a state of inanity, who was it that always remained fresh and vigorous, and brimful of enterprise?—the irrepressible, the irresistible Don Diego! I say irresistible advisedly; for his only fault has been an overruling devotion to the fair sex, upon whom he has squandered his money, even as the prodigal of old. But he is now the happy husband of a charming Sonoranian lady, Doña Cloena, whose fascinations have at length subdued his erratic heart, and his children are even as the apples of his eyes. Rich in experience, rich in ranches, rich in silver mines, rich in family—long live Don Diego!"

Soon after the permanent reoccupation of the post, boats were *hauled* rather than towed up the river from the mouth to the Fort; then one or two little side-wheel steamers were built on the river, out of which grew the Colorado Steam Navigation Company. The first steamer making the trip from the Gulf of California to Yuma landing, arriving on December 3rd, 1852, was the *Uncle Sam*, owned and commanded by Captain Turnbull, by which steamer the post was supplied until June 24th, 1853, when run ashore a few miles below the post and abandoned. Her first trip up occupied fourteen days, being much impeded by an earthquake which changed the channel of the river. She returned in fifteen hours, and made the next up trip in three days. On January 18th, 1854, Captain George A. Johnson, of the Colorado Steam Navigation Company, reached Yuma with the 60-ton side-wheel steamer named *General Jesup*, after the then Quartermaster-General of the United States Army, since which time the river has been regularly navigated by steamers; but until 1872 freight for Arizona was shipped from San Francisco in brigs and schooners at irregular intervals, and at the mouth of the river transferred to barges, which were towed up to Yuma by stern-wheel steamboats. In 1872 a regular line of ocean steamers was established by the Colorado

Steam Navigation Company through from San Francisco to Yuma *via* the Gulf of California, which continued until the Southern Pacific Railroad reached the river in the Spring of 1877. The *General Jesup* was the first steamer to ascend the river above Yuma, leaving Yuma on her first trip on January 2d, 1858, under the above commander, and reaching a point twenty miles above the present site of Hardyville. Frank McBride, one of her crew, is still on the river. On her return trip she met the *Explorer*, a little stern-wheeler used by Lieutenant Ives in his exploration of the river. At this time no white men lived above Yuma, and the fuel was gathered as they went along. The Indians on this occasion manifested no hostility. The original *Colorado* was the only other steamer plying between Yuma and the mouth of the river. On her down trip the *Jesup* ran on a large rolling stone, sank just above Chimney Peak, was raised by the *Colorado* and towed down to Yuma. Barges were not used until Captain Trueworthy came with the *Esmeralda*, since which freight is seldom carried on the river any other way than on barges towed by steamboat.

For some years after the reoccupation of the Fort, the town gained but slowly in size and importance, the Yuma Indians, though conquered, making things uncomfortable at any distance from the Fort until 1857, when kindness succeeded where force had failed. The Yumas in that year made a coalition with the Mojaves for the purpose of attacking simultaneously and in concert the Pimas and Maricopas 200 miles up the Gila. The Mojaves failed to put in an appearance on time, and the attacking force of the Yumas were rewarded for their punctuality by extermination, only two of the party succeeding in returning to the Colorado with the intelligence, on receiving which the remainder of the tribe, in a frenzy of grief, killed the horses of their lost ones, and cast nearly all of food, clothing, etc., which they possessed into the fire kindled to burn the bodies of the horses, as they were unable to cremate, as customary, the remains of their dead relatives. The remainder of the tribe would thus have died of starvation, but for food distributed to them from the commissary supplies at Fort Yuma by Major Heintzelman, then post commandant, since which time the Yumas have been continuously peaceful. These improved conditions led to a more general occupation of the county, and consequently promoted the growth of the town. Then came discoveries of gold in various parts of the county, and in 1861-2 Yuma was very prosperous, until in the latter year it was washed away by an unprecedented freshet on the Gila, the water standing nearly twenty feet deep on a ranch in the Gila bottom just above the town. It was soon rebuilt, and in 1864 an extensive Quartermaster's depot was erected on the Arizona side by Captain William B. Hooper, A. Q. M. Vols., Yuma being then the distributing depot for the military posts in Arizona. The depot was burned in 1867, and at once rebuilt by Captain W. B. Hughes. Major Hooper, on his resignation from the service, entered into mercantile business in Yuma, in which he continued with success until he sold out to James M. Barney, previously a merchant in Santa Cruz and Watsonville, California, ruined by the drought of 1863–4, when he came to Yuma, engaged in freighting, and was afterwards Superintendent of the Quartermaster's depot, whose employees were then numbered by hundreds. At one period 900 mules were kept there, the Quartermaster's Department then doing the freighting, which for some years past has been done by contract. Mr. Barney subsequently became a partner of Hooper's, whom he afterwards bought out. Within a brief period he has purchased a large interest in the Silver King mine, paying originally $300,000 for it. That is what befell him in consequence of having been driven out of California by drought!

In 1870 the county seat was removed from La Paz to Yuma. In 1873 the first judicial hanging in the territory took place here. In 1877, on an appropriation made by the Legislature of territorial bonds to the amount of $25,000, which realized $21,265.62 currency, a penitentiary was commenced, now so far completed (the money having been all expended) as to accommodate twelve or fifteen prisoners; a large portion of the expenditure having been incurred to facilitate future work contingent upon further appropriations. In May, 1877, the Southern Pacific Railroad reached the California bank of the Colorado, and in the fall months of the same year their bridge was completed to the town. The draw-bridge is a Howe truss, 187 feet in length, can be pulled around by one man, and is provided with machinery by which it can be opened and closed in less than three minutes. It is composed of six spans, of eighty feet each, on piers of seventeen cedar piles, each driven to a depth of twenty-six to thirty-two feet. Every span is an independent truss in itself. The effect of the resistance presented by the piers is to deepen the river channel to eighteen feet, which, so far as it goes, is a benefit to the navigation of the river.

The railroad company has fitted up an ice-house in their new warehouse. Their cars have been supplied with ice brought from Fort Laramie, and it is surmised that the company may secure a surplus for sale to citizens.

Yuma is 178 miles above the mouth of the river at Point Isabel, eight miles above the line of Lower California, twenty miles above that of Sonora, and 126 feet above sea level; the river is about 500 feet in width at the town; the population was, at the census of July, 1876, 1,500, but is probably now over 2,000; the business done being extensively and heavily wholesale, is much larger than the population indicates — probably equal to that transacted in an average Californian town of six times its extent. *The Sentinel* represents the press effectively, notwithstanding that the intense heat of the climate might be supposed incompatible with intellectual brilliancy; but, as will be hereinafter set forth, heat on the Colorado and its adjoining deserts is peculiar in its workings. Though the thermometer here during some months of the year runs largely above 100 degrees, the natural location of Yuma, aided by railroad facilities, is such that its population and trade must largely increase with the settlement of Arizona, at further extent of railroad construction.

Yuma as a sanitarium begins to attract much attention. The most competent of medical authority unite in declaring that for bronchial, lung, and kidney diseases it is almost unapproachable. Dr. Loryea, of the Hammam Baths, San Francisco, who has devoted himself to studying the effects of heat on the human system, is enraptured with the hygienic qualities of the climate. Sun-baths can be obtained with ease, the nights are delicious, and the steady, unbroken thermometrical range for the fall and winter months must make it unapproachable.

Ehrenberg is the only other town of importance in the county, and was so named in honor of the distinguished mineralogist, Herman Ehrenberg, who had become interested in mines in the vicinity, but was murdered at a station on the Colorado desert, California. The town—then designated Mineral city—was founded by an association in March, 1863, of which Herman Ehrenberg was elected surveyor. The route to the placer mines discovered in 1862–3 laid through La Paz, six miles above Ehrenberg. But at a later date a wagon road was opened leaving La Paz to the north, starting from Mineral city, which in 1867 was again laid out and surveyed as the town of Ehrenberg. A ferry was established here as far back as 1862, but the new town amounted to very little until 1869 or 1870, when there was a movement to it from La Paz, the decay of which was partly caused by the working out of placer mines, and a change in the river which left it without a landing; also the change in the line of travel, and the removal of the county seat in the latter year. Ehrenberg is 130 miles above Yuma. The California and Arizona stage line here crosses the river on the route from Dos Palmas, on the Southern Pacific, to Wickenburg and Prescott, another stage from Wickenburg leaving for Phœnix, and connecting with the southern line. Here, too, is landed from the river steamers the freight for Prescott, (hauling of which costs four and a half to five cents per pound) and other interior points. The town consists of one straggling street of adobe houses facing the river, and contains about 500 inhabitants. It contains several large branch-business houses, among them being one of James M. Barney.

Castle Dome landing is about thirty miles above Yuma, and fifteen from the Castle Dome mines. There is a smelting furnace here, and argentiferous and copper ores are shipped from here to San Francisco. Gila city, twenty-four miles above Yuma, on the Gila river, will probably become of some importance on account of a revival of its placers, partly by new discoveries, and partly from recent operations undertaken on the river bed. For a time it had an active history, having once been the seat of a vigorous placer camp. It is now the first station out from Yuma on the overland stage road.

In Mojave county the first town reached is Aubrey Landing, 235 miles above Yuma, on the north bank of the Bill Williams river, which divides Yuma from Mojave county. Here freight is landed for the southern portion of Mojave county, including supplies to and exports from the McCracken and Signal mines, the "Planet" copper mine, south of the Bill Williams river, the mines and towns of the Big Sandy and its tributaries, and those of the Cedar Valley District. It is expected by some that the freight for Prescott will soon come by the way of Aubrey, instead of by Ehrenberg.

Planet town is about twenty-five miles east of Aubrey. The McCracken mine is, from Aubrey, twenty-three miles direct and thirty miles *via* Planet. There are over 100 persons employed and resident at the McCracken.

A few miles above the confluence of the Big Sandy Creek with Bill Williams river, are the twin towns of Virginia City and Signal, about nine or ten miles from the McCracken and Signal mines. The basis of Virginia City is the new McCracken twenty-stamp mill, which will probably be in full operation by the time this work is published, and is expected to crush daily seventy to eighty tons of ore. A population of 600 to 700 is claimed for this place, none of whom, willing and able to work, are idle.

Below Virginia City, half a mile, is Lyonsville, sarcastically said by Virginians to "consist of one house to be built, and the skeleton of a corral." Immediately north of the mesa on which Virginia City is located, is the Mexican settlement of Tortilla Flat, of which the leading industries are said to be raising water-melons, making adobes, and keeping bit saloons. North of the flat again rises a broad and almost level mesa on which Signal city, half a mile from Virginia city, is built, but the intermediate ground is said to be rapidly filling up. Signal city is based upon the mill of the Signal mine, here located, which was completed on September 25th, 1877, and expected to crush sixty tons of ore daily. Four or five miles above, on the Big Sandy, is Greenwood, where a ten-stamp mill has for some time been working ores from the McCracken mine, from which it is about twelve miles distant.

North of the thirty-fifth parallel, in this county, obtaining their supplies and making their shipments *via* Hardyville, the present head of navigation, is a group of mining towns or camps, on both slopes of the Cerbat Mountains. Cerbat, thirty-five miles from Hardyville, contains about 100 inhabitants. At Mineral Park, the county seat, six miles north of Cerbat, there is a five-stamp quartz mill, and a population of about 200. The water here is so strongly impregnated with unpalatable minerals that the supply for drinking has to be brought from a cañon some few miles distant. Chloride Flat, six miles north of Mineral Park, had two smelting furnaces several years ago; there are several gold mines in its vicinity, and some indications of cinnabar in the district. These places are all on the western slope of the Cerbat range. There is a mining village at Stockton Hill, on the east slope, and another of about 100 inhabitants at the Hackberry mine, east of the Peacock Mountains, which terminates the list of centers of population in Mojave county.

On May 30th, 1864, a meeting of citizens was held at Granite creek, Yavapai county, and a town was established thereon named Prescott, "in honor of the eminent American writer, and standard authority upon Aztec and Spanish-American history." The site thus selected is near the intersection of the 34th parallel of latitude with the 112th of longitude. The streets all run with the cardinal points of the compass. A like excellence of judgment was shown by its founders in naming the streets after persons identified with the former or present history of the territory, such as Montezuma, Cortez, Marina, Alarcon, Coronado, Whipple, Aubrey, Leroux, Walker, Laird, etc. Its broad streets reach out from a central plaza, giving ample space, and avoiding that density of structure and population which so jeopardize the sanitary condition of many of our large cities. The buildings are of stone, brick, and pine. Bricks are worth $12 per thousand; lumber, from $25 to $35. There is a sash, blind and moulding factory, a planing mill, several saw mills, brick yards, and lime kilns, two public halls, two newspapers, two hotels, several boarding houses, twenty-five stores, two drug stores, twenty saloons, three breweries, and over twenty lawyers. The weight of goods sold every month at the stores is estimated at not less than 500,000 pounds per month; one firm in one month shipped 95,973 pounds, on which the freight charges amounted to $8,000. Eight of the larger business houses carry in store from $20,000 to $100,000 each. A new bank building has recently been completed, 72 feet by 29 feet 5 inches.

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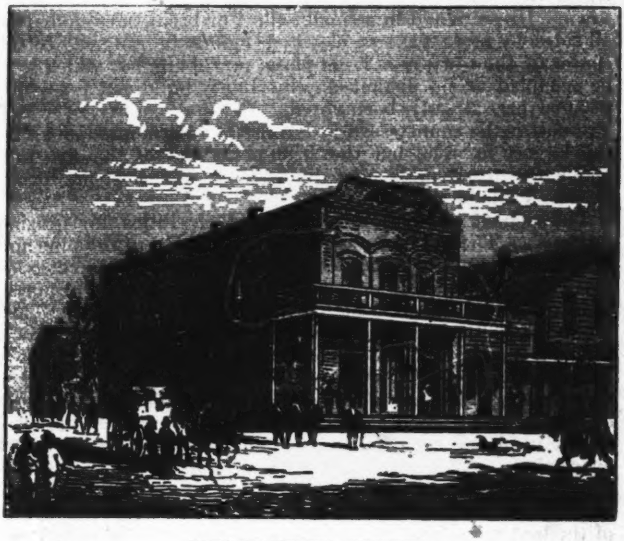


BANK OF ARIZONA, PRESCOTT.

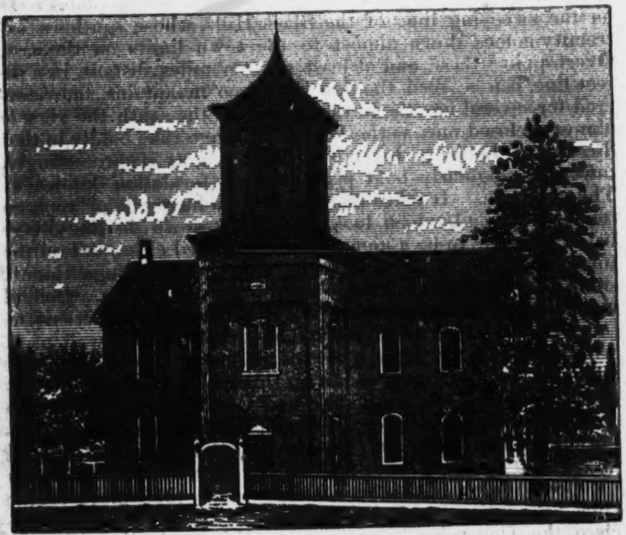
Prescott is really a homelike place, and would be considered so anywhere. Climate requires one either to live in or out of doors. In Prescott, with high altitude, cool, even raw, chill evenings, its sub-Alpine flora, and the other indications of a decidedly temperate region, one must really live in doors. In Tucson the reverse is almost true. There are no adobes here. There are a few log dwellings—reminiscences of earlier days; but the large majority of buildings are of frame, some business places being of brick, with a few residences also. Really, and without flattery of any kind, Prescott is a very attractive town. It is situated in a small valley, or basin, surrounded on all sides by more or less elevated mountain ranges. In the center of the town is a large plaza, now bare, but which is to be occupied at no distant day by county buildings, for which $60,000 has already been voted. Yavapai county, of which Prescott is the county seat, is, it must be remembered, not only the largest in area, but the best populated of the five into which the territory is now divided. It claims about fifteen thousand inhabitants.

The vicinity of Prescott offers ample facilities for grazing purposes. The hill and mountain sides, far up to the pine and cedar belt, are covered with the bunch grass—quayotto or black grama. The soil is more moist than to the south or north. It is arid and desolate in both directions to some extent. Sheep do better in the vicinity of the Bill Williams mountains, portions of the Rio Colorado-Chiquito, the famous San Francisco mountains and the vicinity of Mineral Park and the Hualapais than in the immediate vicinity of Prescott. Thereabouts the cattle ranges are good and ranches are quite plenty. Timber—pine in plenty, cedar and dwarf oak to some extent—is found everywhere. This portion of Arizona and north of it will be the chief source of timber supply.

On the northern spur of the Bradshaw or Silver range, one of the best metalliferous formations of northern Arizona, Prescott sits in pleasant security, expecting prosperity and believing herself the favored town of this wonderful territory. Its altitude is 6,318 feet above the sea level, and a stranger soon appreciates the fact. The landscape is as marked and massive, but yet its features are smaller and must be taken more in detail, than in the southern towns. There is not the same marvelous scope of vision, and hardly as many wonderful effects of color-tone and distance. Still, the artist's eye may readily find materials for captivating pictures, even if he cannot make the range so large as at Tucson or in the valley of the Santa Cruz, where the bold and well defined peaks and serrated summits of the Santa Ritas look down in lusty beauty on the one hand, and the bald, bold outlines of the San Coyetano or Atascoso mountains hem in the other. Towards the north the little plain or plateau on which Prescott nestles opens into a broad sweep of plain, on which Fort Whipple is located, and across which the vision takes in on the east the saw-like summits of the Prieta range, with the bold outlines of Granite peak to the west thereof, while still further to the south and west are blue outlines of the St. Marie mountains, from the midst of which Hope Peak lifts its bold head in the hazy distance. To the north and east again the eye glancing over Prescott plains rests on the sweeping lines of the Black Hills, whose southern extremity comes down almost to the town limits on the east. Overtopping these and at least seventy miles distant, in a direct line, can be seen the San Francisco mountains, snow-covered for several months in the year. To the south the view is almost a closed one, as the Bradshaw range rises boldly in that direction. Looking down over the town, as if protectingly, towers a singularly bold peak or rock formation known as Thumb Butte. It takes its name from a huge pile of rock on its northern end, which looking directly down on the village below, appears to be a gigantic hand doubled close, and on the top of this closed hand there appears to be a huge thumb, slightly bent, the end of which lies toward the town. Behind this peculiar formation there is a small table land, across the south end of which are unmistakable evidences of a wall, used, without doubt, for the purposes of defense. There are some appearances left of approaches up this rock and of cave-dwellings on the top. As to the east and south of the town, a line of defense works, so irregular and broken as hardly to be followed, has been made out, it would seem certain that the site of Prescott was also that of a town or post, once occupied by the people who cultivated centuries since the valleys of the Gila, Salina, San Pedro, Santa Cruz, the Rio Verde, Rio Francisco, the Colorado-Chiquito, Agua Fria, and other streams, leaving as proofs of their industry and skill the evidences of old towns at the Casa Grande and near the Tempe and Phœnix, on the Salt river, as well as many other signs of their extent and character.

The flora and timber of the neighborhood are decidedly those of the temperate zone. As befits the altitude, there is a clear, cold, gray tone in the atmosphere, which lends a peculiar charm of its own to the surrounding landscape. The great pines which clothe the mountain sides almost to their tops fill the still night with that low, soughing wind-music that has such an indescribable though melancholy charm. The sunrise and sunset, especially the latter, drape the tall ridges and high peaks in a variety of striking hues, while the deep, serrated sides of the range lend deep shadows wherewith to tone the picture. In the midst of them, close to the ground, broods the peaceful town. It has more hopes than realization, more prospects than prosperity, yet it is thriving and busy.

A short distance to the north, not over a mile, lies Fort Whipple, now the headquarters of the Department of Arizona, and the most important post, as it is very nearly one of the oldest, in the northern portion of the Territory. The presence of General Kautz and the other officers, etc., of headquarters, tends to make Prescott attractive. As to the cost of living, board, etc., houses rent in Prescott from $15 to $90 per month. Board can be had for from $8 to $10 per week. It is, however, possible for men who choose to "bach" to live on thirty to fifty



SCHOOL-HOUSE, PRESCOTT.

cents per day. Groceries are generally high. The long distance from the railroad and the high rate of wagon transportation causes this. Beef is 25 cents per pound; bacon 35 cents; hams, 37½ cents; bread, 20 cents per loaf; flour, California, $12 per 100 pounds, Arizona, $10, New Mexico, $10; potatoes, 6 to 8 cents per pound. In the vicinity of Prescott are numerous ranches, where potatoes, celery, asparagus, etc., are raised. Cows do well. Nutritious feed can be found for ten months in the year. Good grazing on government land can be found. Milk, 20 cents per quart; butter, 75 cents to $1 per pound. The chief sheep ranges of the county are those on the Little Colorado, Verde and Agua Fria valleys—grass the year round. Miners' wages are $4 per day for first-class men; balance $2 per day and board. Carpenters, $6; blacksmiths, $5 and board; painters the same; wagon-makers, $5 to $8; laborers, $2 to $3; ranchmen, $30 to $40 per month and board.

The climate in the vicinity of Prescott is delightful most of the year. Snow falls during the winter, but disappears very rapidly. Sleighing is almost impossible. Perhaps for one or two days in the middle of winter the snow lies long enough for a short ride, but not very often. During July and August the middle of the day is warm, but in the shade there is always a breeze blowing, and it is cool. Prescott can boast of the finest school building of this or any other sister territory. It is of brick, with recitation rooms on the first floor, and a large audience room above. The building cost $20,000, and was erected under the direction of ex-Governor Safford, Superintendent of Public Schools. The number of children in daily attendance averages 150. They have two teachers, Mr. and Miss Sherman, who are very efficient. There are three churches—Methodist Episcopal, Methodist Episcopal South, and the Presbyterian. The Reverend A. Gilmore, Post-chaplain at Fort Whipple, occasionally officiates at one of the churches in the evening.

There is also the Prescott Library Association, composed of leading citizens, which has a good building on Cortez street, with a public reading-room containing over fifty newspapers from all points, (including the *Post*, daily and weekly) and a library of 263 volumes. The officers are: Paul Weber, President, and John Lloyd, Corresponding Secretary. The association is free from debt, owns its premises, is fairly patronized, was established by voluntary contributions from citizens of Prescott, and is maintained by contributions and entertainments; progressive in character and liberal in management.

In addition to the railroad to Dos Palmas there is the Pacific

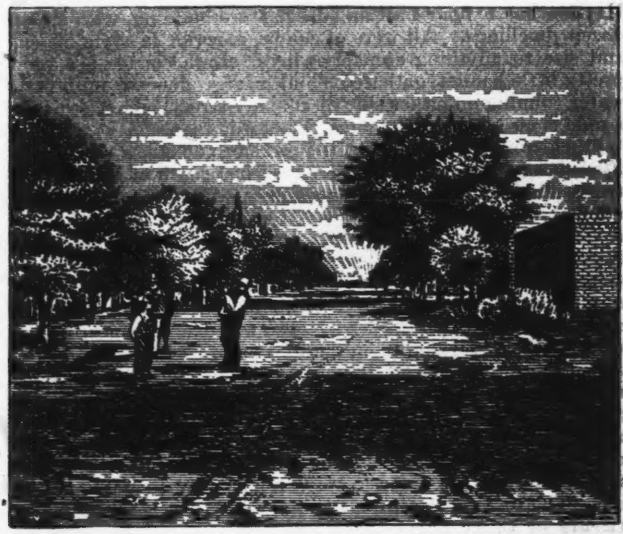
Coast Steamship Company, whose rates are: San Francisco to Santa Monica, cabin, $14; steerage, $9. Santa Monica to Los Angeles, $1. Los Angeles to Dos Palmas, by Southern Pacific Railroad, first-class, $13.10.

Prescott has a resident population of about four thousand. The village taxes for 1877 amounted to $7,000, besides village licenses. The capital of the territory was first located at Prescott in 1864, removed to Tucson in 1867, and back again to this place in 1877. The business firms of this place are doing the largest business in the territory, and the directory which the reader will find in the appendix of this work is in proof of the fact.

The almost failure now of the thirty-fifth parallel route leaves Prescott out of the probability of being on a continental road. To what then will it look? An active development of great resources; to the fact that the region round about will sustain a considerable population, and to the wise encouragement of a system of narrow-gauge railroads, by which the valleys, etc., of the great Colorado plateau can be traversed. The Mormon road south to St. George, Utah, will be pushed through Arizona by the Union Pacific people, who now own it, and who are determined to construct a line direct to the Gulf of California, via Arizona and Sonora, to Guaymas. Such a road would not pass to the east of Prescott. The general direction of such a line must be south-east to Tucson, or near it, and then down the valley of the Santa Anna to Sonora. The route to Guaymas is already surveyed. Such a road will materially help Prescott, but must still more largely tend to make Tucson a great railroad center. This will be still further increased by the splendid mining developments which the Tyndall and Aztec districts, the Arivaca and Santa Ritas in general, will surely show at an early day.

The only other towns definitely known at present in the county are those of Alexandra, in the Peck mining district, to which a good road is now constructed, and a small settlement growing up about or near Camp Verde, to the east of Prescott. There are some hamlets with a few inhabitants, and a store or two, in the vicinity of the more prosperous mining districts. At the Clifton copper mines, on the border of New Mexico, there is a population of about three hundred persons.

Phœnix, the county seat of Maricopa county, is about two miles north from Salt river, and is the business center of that highly productive valley. It is also within thirty miles of important mining districts to the east. It was laid off as a town in 1868, and now has six or more stores, three flouring mills, (in and near) a good public school, and other advantages. The houses are nearly all constructed of adobe, lumber being expensive; the streets are named after Indian tribes and old Spanish explorers; they are very wide, and bordered by cottonwood and other trees, which keep green throughout the year, as in other valleys of southern Arizona. It is abundantly supplied from the surrounding country, not only with ordinary agricultural productions, but with fruit, at prices in general very remunerative to the grower. There is a public library of 250 volumes, owned by a literary association. It is sixty miles from Florence, on the stage road from that place to Wickenburg, Ehrenberg, and Prescott. Its population is now about 500, about half Mexican. The temperature in summer ranges from eighty to one hundred degrees, and in winter from forty to eighty degrees. East Phœnix and Hayden's Mill are small settlements gathering about two large flour mills. The stage road passes through both.



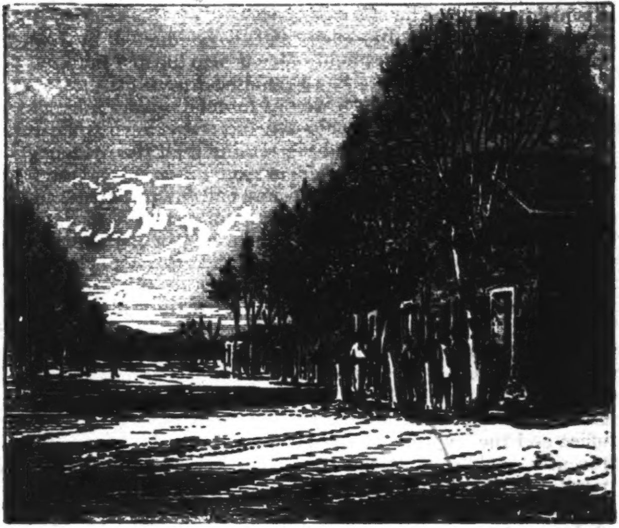
PHŒNIX.

The Salt river valley along the line of stage travel presents more agricultural activity than all other points in the territory. Over 9,000 acres of land are in barley, wheat, and alfalfa in the limits of the three settlements of Hayden, East Phœnix and Phœnix itself. One of the main canals is six miles in length and the other nine. There is water sufficient already accessible to supply a half million acres.

Near and at Tempe is a Mormon colony of eighty families. Hayden has a flour mill and large store building, with a half dozen dwellings. All were of adobe, superior in style, finish, and size to anything seen elsewhere. East Phœnix is a very pretty little hamlet, gathered about a large flouring mill, with water running on either side of its only street, which for half a mile is also lined with young cottonwood trees.

Wickenburg is situated at the forks of the stage road from Ehrenberg to Prescott and Florence, just south of the line between Yavapai and Maricopa counties. It contains about 200 inhabitants, and was named after Henry Wickenburg, who discovered the great Vulture mine, about ten miles to the southeast, for working the ores of which two mills have been constructed in Wickenburg. The company's forty-stamp mill is now silent, on account of litigation; but the ten-stamp (Smith's) mill, employing 130 men, at average wages of seventy dollars per month, is working night and day on ores from said mine. The stage fare from Dos Palmas on the Southern Pacific Railroad to Wickenburg is thirty-six dollars, currency. The secretary of the stage company, Dr. Pierson, resides here, it being the nucleus and base of supplies to some extent for the California and Arizona Stage Company's line. It contains one hotel, two restaurants, two stores, stage repair shops, signal station, etc. The town of Vulture, two miles north, consists of some twenty or thirty adobe buildings, in which but few persons now live. The mills at that point will, when they restart, lend much activity to this otherwise bleak and desolate region. Along the Hassayampa river, in the vicinity, are several fruit and vegetable gardens in a high state of cultivation. The town was originally embraced within the lines of Yavapai county, but by act of the Legislature was transferred to Maricopa.

Florence, the county seat of Pinal county, is situated on the southern bank of the Gila river, 225 miles above its mouth, 70 miles west-north-west of Tucson, 200 miles east-south-east of Prescott, and 500 feet above the sea-level, the heat therefore being less intense in summer than at Tucson or Yuma, but much greater than on the adjacent hills and mountains. It is the center of the very rich agricultural valley of the Gila, and is connected by stages and good roads with Prescott, Ehrenberg, Phœnix, Tucson, and Yuma; also with the Globe, Pioneer, and other mining districts. It is the southern terminus of the California and Arizona stage company's lines from Dos Palmas, Ehrenberg, Prescott, and Wickenburg; here that line connects with Kerens & Mitchell's southern line from San Diego, via Yuma, Tucson, Mesilla, N. M., and El Paso, Texas, to Austin, Texas; it is also the starting point of stage lines to the Globe and Pioneer mining districts, the latter at Silver King being thirty miles distant. To Globe city a new road has recently been constructed. By previous wagon roads the distance was 110 miles; by trail, 70 miles; but the new road has shortened the wagon distance to ninety miles.



FLORENCE.

Florence is situated in a very rich tract of bottom and second mesa land. Water is brought to the city, and distributed through its principal streets in small "zanjas," or artificial streams of running water, along the banks of which are planted numerous shade trees, as at Salt Lake city, San Bernardino (Cal.) and Phœnix, giving the town a very picturesque appearance, and relieving the eyes from the glare of the hot sun. The buildings are mostly one-story adobes, with wide porches. The river averages about 600 feet in width, and 4 feet in depth, with low banks. There are three flouring mills in or near the town, school-house with one hundred pupils, a Catholic church, several stores, a smelting furnace, a brewery, two hotels, several restaurants, six physicians, and other conveniences appertaining to a population of 1,500, more than half of whom are of Spanish origin. The *Citizen*, formerly of Tucson, has been recently removed to Florence, and is conducted by John P. Clum. A United States land office is also located here.

A correspondent of the San Francisco *Evening Post*, in a recent letter, described " the town of Florence as containing about 1,500 inhabitants, about evenly distributed between Americans, Mexicans and Spaniards, and yet retaining all the evidences of its Mexican origin. The streets are laid out wide and straight, shaded on each side by a row of fine cottonwood trees, and at their roots along each sidewalk a babbling stream of running water, thus reminding us of Salt Lake city in its general appearance. Many buildings of adobe brick are now being erected, and the streets present a lively and thriving appearance. Two hotels are in the full tide of success—the Elliott and the Florence. It is the county seat of Pinal county, and has good accommodations for the officials and courts. Its county clerk boasts the finest and most complete records of any county in Arizona. A good and well arranged post office is conveniently located on the main street, which is also used for the stage office and the express office of Wells, Fargo & Co., who have recently established agencies at every important point in the territory. The buildings are all built of adobe, as lumber is very high, and has to be hauled all the way from Prescott, a distance of nearly 200 miles. Like other southern frontier villages, the buildings are only one-story high, generally having a wide porch or veranda surrounding them. Lying directly in the path of the approaching Southern Pacific Railroad, which will no doubt reach within 100 miles of here this coming winter, and with the near proximity of the rich silver mines of the Pioneer, Pine Grove and Globe districts, the rich and well cultivated agricultural lands that surround it, its flour mills, its water privileges, and good climate and central location, the future prospects of Florence are indeed promising. Good stage roads lead from Florence to Prescott, Phœnix and Ehrenberg, on the north, Tucson on the south, Yuma on the west, and the mining districts north-east. The climate of southern Arizona is very warm, yet in the vicinity of Florence it is not as warm as Tucson or Yuma, nor as warm as southern California, its altitude being about 500 feet. The rainy season usually commences about the middle of July and lasts about two months, with a shower nearly every afternoon, which is duly appreciated. In the mountains and mining districts the hot air is rendered endurable by a breeze nearly every day, and cool and pleasant evenings and nights enable us to lose in refreshing sleep all recollections of the hot day preceding."

Another writer says: "The town has a home-like promise in its out-of-doors aspect. It lies in the Gila valley, encircled by a wide stretch of delicious green and ripening fields of grain and alfalfa. To the north-west is a high, extensive plain. To the south and trending east are the usual ranges of low, volcanic and granitic mountains, while across to the south the eye can discern the far outline of the Picacho peak. To the north and trending west can be seen a range of bold outline, marked on the map as Superstition mountains. There is a wide expanse of undulating plain to the east, and south-westerly the stage road to this place skirts near the foot of the volcanic hills already noticed. A considerable quantity of land in the valley is under irrigation. Florence is sure to be an important town."

At Adamsville, four miles west of Florence, is the Bichard mill, said to be the first flouring mill erected in the Territory. It consists of a short street of adobe buildings, the neatest and best of which are that of the mill and the dwelling attached thereto. Picket Post promises to be a trading and local point of importance. It contains at this time a store, five-stamp mill, and a number of dwellings. Being on the road to Globe, it is a stage station of importance.

Globe is a recent and vigorous outgrowth of mineral discovies, in the district of that name; it is about ninety miles north-east of Florence, on Pinal creek, in a mountain ravine running north and south, in which water can be found anywhere at 15 or 20 feet, below which it is difficult to sink wells, on account of the strength of the underground current. Much of the drainage of the Pinal mountain flows through it, supplying abundance of water, even in the dryest of seasons. Lime is also obtained from blue limestone. Firewood costs $5 per cord, and lumber $100 per 1,000. The Indians gather natural dried grass, bring it in on their shoulders, and sell it for one cent per pound. Grass is abundant; fresh butter and milk are to be had; fresh beef and mutton are cheap; and from the "Wheatfields," a few miles below on Pinal creek towards Salt river, are brought various vegetables and the finest melons; eggs and chickens are scarce. Grain is obtained from the Gila and from New Mexico, to which (at Mesilla) have been sent a large share of the products of its mines; but the completion of the new road to Florence, especially with railroad facilities to the westward, is likely to bring back most of this trade to California. There are at Globe city one or two smelting furnaces, several quartz mills and a brewery, besides the usual etceteras of a new and thriving mining town.

A few miles below Globe city, on Pinal Creek, the flow of water increases, and the valley widens out and sustains the settlement of Wheatfields, where irrigation is extensively practised, and malarious fevers are prevalent. There is much valuable water power between this place and the confluence of the creek with Salt river, which hereafter may give rise to flourishing villages. About twenty miles from Globe city, at McMillan's camp, where the celebrated Stonewall Jackson and other rich mines are located, a mining village named McMillanville has recently sprung up, which already contains, within a square mile, 300 inhabitants, three blacksmith shops, one carpenter's shop, a bakery, two stores, a barber shop, saloons and post-office. Adjoining the Silver King mine in the Pioneer district, a similar village has commenced with promising prospects, and the recent mining developments in other portions of Pinal and Maricopa counties are such as to indicate further accessions of mining villages. At the old and important stage station of Maricopa Wells, at which the route from Prescott southward enters the Gila valley, are two stores and a large ranch.

The early origin of Tucson is rather obscure. Coronado's reports of his expeditions to the "Seven Cities of Cibola," (N. M.) in 1540–43, though very minute in details, do not mention the valley of Santa Cruz, through which he probably passed, as being inhabited. A claim is made for it by Col. Hodge, in "Arizona as It Is," (on what data is not stated) that this valley was settled about the year 1560, which would make it the oldest city in the United States but one, it being stated that Santa Fé was settled in 1555, and San Augustin, Florida, in 1565. Three miles below Tucson, and a mile due east from the Casa de Dominic Padre (or the Mission of San Augustin) is what appears to be an old town in ruins, but no clue can be obtained as to its origin, history, or the date and circumstances of its destruction. It is again believed that Tucson was commenced as a Spanish military station to protect the Mission of San Xavier del Bac, nine miles south, in 1694, or very soon afterwards. About the oldest inhabitant there, born in Tucson in 1819, is Francisco Leon. As far back as he recollects it was a military post, at which there were stationed about eighty or ninety soldiers. There were about 140 hovels, without doors or panels, and the windows, when there were any, had no frames; these buildings had a prison-like and angular appearance, inside and out. There were about three hundred citizens; the cultivators sold their produce to the government. Until about the year 1825 no late frosts were known to injure the fruit trees in blossom; and large quantities of grapes, peaches, pomegranates, quinces, apples and apricots were raised in the valley west of Tucson.

Bartlett, in his "Personal Narrative," published after the Mexican war, but prior to the Gadsden purchase, states that Tucson "has always been, and is to this day, a presidio or garrison, but for which the place could not be sustained. In its best days it boasted a population of a thousand souls, now diminished to about one-third that number. * * * * * The lands near Tucson are very rich, and were once extensively cultivated; but the encroachments of the Apaches compelled the people to abandon their ranches, and seek safety within the town. The miserable population, confined to such narrow limits, barely gains a subsistence, and could not exist a year but for the protection from the troops. More than once the town has been invested by from one to two thousand Indians, and attempts made to take it, but thus far without success."

A few more years and Garcilla, commanding the Presidio, announced to the soldiers drawn up in line, the turning over, under the Gadsden purchase, of that portion of the territory to the United States. On March 10th, 1856, all the Mexican authorities and troops evacuated the place. Eleven days previously the first American store in Tucson was started by the arrival of Solomon Warner, from Fort Yuma, with thirteen pack animals loaded with merchandise. Hooper & Hinton, of Fort Yuma, were interested in the adventure.

Late in 1856 Charles D. Poston made his second visit to Arizona, by way of Texas and New Mexico. He describes Tucson at the time as being a place of from 300 to 400 Mexicans, and about 30 Americans; two American stores, one flouring mill, and some other business places. "The houses were all adobes, and generally damp and unhealthy. * * * Tuscon was, under Mexican government, a northern presidio, to prevent incursions of Indians. It will be little more under American government, and never a place of importance." In this judgment, at least, Mr. Poston is clearly mistaken. "The American population have been for about twelve months principally engaged in waiting for the troops, as nothing could be done previously. * * * The only population in the territory is at Tucson. The vote at the election, which was held September 1st, was 66; and now having given them legal officers, and a copy of the statutes, law and order prevail at Tucson. It is really," he added, "the most orderly, quiet, civil community that I have seen, and they seem determined to keep it so."

In 1858 mail coaches commenced to run. December 15th, 1859, is the date of number 42, volume I, of *The Arizonian*, a Democratic paper, wherefrom it appears that on or before October 27th of that year a flour mill was carried on at Tucson, and on December 1st a stage line had been established from Tucson to Fort Buchanan, via San Xavier, Tubac and Calabasas, the fare to which last-named place was $8, and to Fort Buchanan $12. In the issue of March 9th, 1861, appears the editor's valedictory, and an attack on President Lincoln. At this time Arizona was a county of New Mexico. On December 29th, 1863, the Territory of Arizona was regularly organized, and a permanent local organization effected. In the January following J. Ross Browne stopped at Tucson a short time, and in his "Adventures in the Apache Country" humorously describes its aspect and approaches as he saw them. It was then, as now, the center of trade with the State of Sonora, and on the high road from the Rio Grande to Fort Yuma. Two companies of California volunteers were then stationed in Tucson, but were quite inadequate to keep down the Apaches in the vicinity.

In 1866 several mercantile firms in succession brought large stocks of goods to Tucson; building became lively, and substantial and convenient houses replaced the old hovels. The "Sisters of St. Joseph" commenced a girls' school; but it was not until 1871 that, owing to continued efforts of Governor Safford and others, a public school house was built, and its airy rooms handsomely furnished; and now 100 boys and 40 girls are educated within its walls. In a Catholic school under Bishop Salpointe, 160 boys are educated, and in that conducted by the "Sisters of St. Joseph," 76 girls. The town also has a public library. To the brewery is attached a pleasure park and garden. There are good stores transacting a large business. One firm handles during the year 675,000 pounds of merchandise, exclusive of Sonora produce, to the amount of 900,000 pounds exchanged for eastern goods; the average monthly business of this firm amounts to at least $30,000. Another firm receives annually from the United States 400,000 and from Sonora 100,000 pounds. The Sonora trade results from the fact that goods cost but a little more delivered at Tucson than by water to Guaymas, where there is no escape from payment of customs duties, while from Tucson they can be easily taken across the line without observation on mountain trains, when made up into little bales of 100 to 150 pounds each, adapted for pack mules. Thus Tucson has a monopoly of the dry goods trade of Sonora. The imports therefrom are olives, oranges, lemons, tobacco, cigars and silver coin from the mints of Hermosillo and Alamos, each of which is said to coin $50,000 to $200,000 per month. They take back, beside dry goods, boots and shoes, groceries and notions. Two hundred thousand pounds of wool have been shipped from Tucson during the last season, bringing 22 to 27 cents per pound. E. N. Fish has a large mill fitted with the latest improvements. C. T. Etchells has a large wagon factory and blacksmith shop, also manufacturing shafts and other heavy iron work for mine mills. L. Carillo has a beautiful flower, fruit and vegetable garden, with sand and gravel paths, 500 peaches, 2,000 grape vines, 200 quinces, 60 pomegranates, and 9 apricots, all in bearing, and 5,000 strawberry plants that will bear next year; also sugar-cane and a profusion of lovely flowers.

The climate is one of considerable range; in the winters there are frequent frosts at night, succeeded by weather comfortably warm during the day, while the summers are intensely hot, with a sufficient fall of temperature at night to make comfortable sleeping. The spring and fall are quite variable. A little stream flows past the town, the water from which keeps the valley perennially green. The population is not definitely estimated, but exceeds, it is claimed, 4,500, predominantly of Spanish origin.

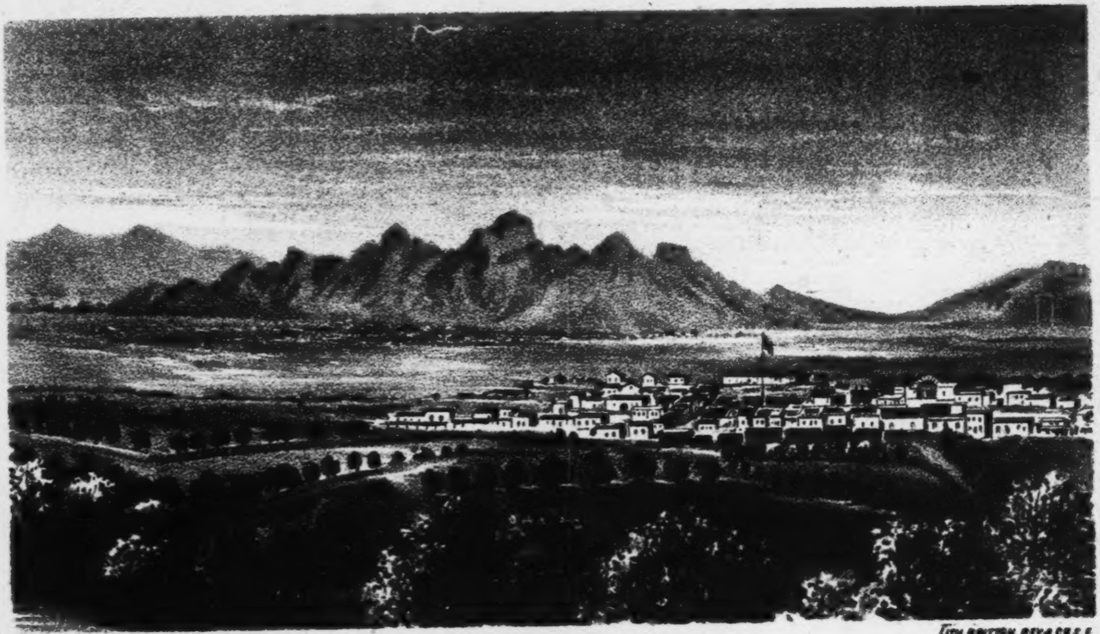
Labor is not in great demand; capital, machinery, and railroads are needed to pave the way for the profitable employment of more labor than is now at command. Highly-skilled mechanics are sometimes well paid; but Mexican field hands are not much above the Chinese level as to habits and compensation. They get fifteen dollars per month and sixty pounds of flour, eight pounds of beans and four pounds of salt, or one dollar per day and board themselves. The same class at mining are paid fifty cents to one dollar and fifty cents per day; white miners, two to three dollars.

With the exception of the reference to the streets of Tucson, now out of date, a description of the surroundings, no more graphic than correct, is found in Josephine Clifford's "Overland Tales," as follows:

"How like a *fata morgana* it looks when you first see it in this enchanted atmosphere: the intensely blue sky overhead, the plain about it covered with sparse grass and fantastic cactus, that hide the sand and make the earth look verdant; the low, white dome and the picturesque buildings clustering about it; the adobe garden walls, with arched gateways, sometimes whitened, sometimes left in their native mud color, toned down by age and the glare of the sun; a tall mesquite tree, or a group of cottonwoods striving heavenward from among the adobe houses; Saddle mountain, with its ever-changing tints and its strong lights and shades in the far distance, and Sugar-loaf or Sentinel hill to the immediate left. On the plain between town and the Sugar-loaf, the ruins of what in any other country I should pronounce to have been a monastery, lift themselves from the fresh, dewy green—venerable, gray, and stately—some wild vine creeping stealthily in at the frameless window, and out again at the roofless top.

"Having purposely avoided a close inspection of this spot, for fear of being compelled to see that the ruins were only coarse mud-walls, standing in a wilderness of hideous sand and clay, flecked with stiff bunch-grass, the contemplation of it with my mind's eye is one of the pleasures of memory to me, even at this day. Could I have avoided passing through the streets of Tucson, perhaps I could think of it, too, as a charming and delightful place. There are gardens down on our left, as we come in from this side, that 'blossom as the rose,' and are overshadowed by just such beautiful, waving trees as we see in among the houses yonder; and from these 'indications,' we are justified in supposing that we will find *parternes* of flowers in the gardens surrounded by those high walls.

"The *élite* of the Spanish population pride themselves on their gardens—flower-beds in the enclosed court-yards; flower-beds raised some three or four feet from the ground and walled around with stones; but if the flowers that grow on these elevations are 'few and far between,' they make up in color and



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TUCSON

fragrance what they lack in numbers. The court-yard is usually flagged, like the best room in the house, and the whole is kept cool and fresh by continual sprinkling and irrigating."

Tubac and other villages to the south of Tucson are described in a separate chapter on the Santa Cruz valley.

Tucson is seen to be located about two-thirds of the way south-east, on a huge plain or plateau, which presents many very striking features. The wonderful effects of the clear and rarefied atmosphere are seen here at their best. The great plain or plateau in which just above this place the Santa Cruz sinks for many miles, to enter by a subterranean channel the Gila river, near Maricopa wells, is certainly over 100 miles in its greatest length and not less than fifty at its widest, which, from the trend of the encircling mountain ranges, is in this vicinity. Looking north and west the eye rests upon the deep blue faint outlines of ranges at a distance of at least seventy-five miles. Nearer, and in the wonderful foreshortening, which is one of the most charming effects seen here, to the east and west may be seen the bold cones of the Picacho and Desert peaks. They stand out in the translucent sky and the luminous sunrise or sunset, with their wonderful combination of colors, so vivid and startling as to defy even the brush of Turner himself, as if one might walk over to them between breakfast and the gray gloaming which indicates that the night has passed. Nearer and closer, until their serrated summits seem about to bow down to us, on the east, trending from the north-west to the south-east, is a bold and remarkably well-defined mountain range known as the Santa Catalina, which sweeps in a bold semi-circle, framing the Santa Cruz valley in a massive way. The range lowers and a pass opens just to the east of Tucson. The continuing portion of the range is sometimes called the Rincon mountains. It looks wonderfully and fascinatingly beautiful—the deep shadows and purple tones in which the sunset clothed its sides, while the mirage, which accompanies sunrise and sunset in this latitude, and plays such "fantastic tricks" to startle our vision with, gave to the summit lines and peak tops new and shifting images and forms. It is difficult to realize as one looks at the landscape here, that some of the green fields in which Tucson is set like a dark pebble in an emerald border have been under continuous cultivation for over 150 years. Contemporaneously the Pilgrims landed at Plymouth rock, and that other fateful cargo had been placed on the banks of the James river, in Virginia; the Spanish conquerors of Mexico had established a presidio at this point, and the Jesuit Fathers had raised the symbol of Christianity, and erected houses of worship amid savage tribes and in the very heart of a wilderness. The town of Tucson then became the presidio of Tulquson. North of this point there was no settlement or mission, nor west of it either, the Puerta de San Diego being the nearest in that direction. Tucson was then, as now, the principal place in the Territory. It still stands as the representative of the old semi-Spanish-Indian civilization; for the Mexicans comprise two-thirds of the resident population, and "the Church" occupies, with its offices, the place of honor customarily assigned to it in the laying out of a Spanish-American town—the principal portion of the chief plaza or grand square thereof. A map of Arizona will show the value of this point as a trading post, and will indicate also its future importance, provided always the railroads going east and south shall pass through it. Tucson is now the central point on the overland route, and for communication with Sonora. It is the seat of the nearest United States Custom House thereto.

Camp Lowell is seven miles distant, and is the headquarters of military administration for southern Arizona. The town holds the office of the sub-district quartermaster and a U. S. paymaster; the U. S. Surveyor-General has his office and residence here also. There is a well-filled book and periodical store kept by Mr. Mansfield, two weekly papers, an excellent public school building, a Protestant church, and a number of other places not quite so desirable in character. The town is situated on a gravelly mesa above the valley of the Santa Cruz which rises just below the Sonora line, in a spur of the range that runs through Durango and Sonora, hence southward. The stream is quite small, as one looks at such things from a northern standpoint, but there is a good deal of water in it. Men who are posted on irrigation matters declare that the quantity of water in all such streams is so large, and so much is lost by evaporation and sinking, that water withdrawn by ditches at proper points is so much saved. Practically irrigation increases, not diminishes, the supply of water. There is enough here for use, even at the driest seasons. The russet and brown shades of the cured grasses covering the foot-hills and long slopes but set off the vivid green of the moist valley, the more somber verdure of the pines and shrubbery on the mountain sides, and the glorious grays in which nature has invested the grand rocks towering above them all. The enchanting purple tints in which all the distant mountains are bathed at evening, is not wanting at Tucson.

The future importance of Tucson is undeniable. It offers a large field for commercial as well as mining and milling eterprises. The fact must be borne in mind that the Eastern cities and manufacturing centers can as a rule compete successfully, so far as bottom prices are concerned, with San Francisco, in nearly all staple goods. There are certain things—as tea, sugar, coarse clothing for miners, as well, perhaps, as iron, etc.—in which San Francisco is able to compete; but with most articles of use and nearly all of luxury, the difference between New York, Philadelphia or Boston, and San Francisco to this region is a question almost entirely of transportation and its constituents—time, cost and handling. Tucson merchants aver that the advantages are on the side of the Eastern merchants, even though there are 900 miles of wagon transit and the great difference of time to be considered. The importance of Tucson, present as well as prospective, can be better appreciated when it is borne in mind that north-western Mexico, as well as southern and eastern Arizona, are to be largely outfitted and supplied from this point, or some one near it, if in the future the railroad may build up another town. The interests that are identified with mining have already been felt in this region, and day by day must grow in importance. Tucson is also the objective point of supply, etc., for the San Carlos (Apache) Agency, as well as for the Papagoes. The Pimas and Maricopas are west of Florence, and make that place and Adamsville their objective points. The cattle trade is of considerable importance between Tucson and Sonora. With so long and open a frontier line, and the Custom House 70 miles from the front, it is more than probable that smuggling, not of herds alone, but of cigars and many other things, must be an organized business. The business of the eight or nine leading merchants of this place averages about $1,200,000 per annum, one of them doing about $500,000 of this total, and another, whose business is chiefly with the Mexicans, averaging about $350,000 per annum.

The editor of this volume, writing from Prescott in May, 1877, referred to probable railroad construction, and as the remarks bear on the future of Tucson, they are inserted at this point. Speaking of Prescott it was said:

"It does not seem to be on the highway to anywhere in especial; it does, however, seem to be the center of a very rich mining section, which will of itself yet make an important place. Tucson, on the contrary, which struck me as so 'uncomely' in its outward aspect, must have before it a large future of general importance. It is at the diverging point of a great natural geographical high road. The main arterial route east and west must pass through or near it, and from it, going southward, will diverge the main railroad, not only to the Gulf of California, but to the City of Mexico; and so in the not distant future knitting to us the Caribbean sea and the Isthmus of Panama in one great system of scientific highways. Looking at the physical geography of this region, north and south, and viewing its relations to the entire country, I observe that the thirty-second parallel route is through a great valley—that of the Gila—for a large part of the distance it traverses in Arizona. I observe that this is the only valley road opening through the American Cordilleras, from the Mexican to the British line. The pathway of the largest material activity must, then, be found within that basin. My views on the future importance of Tucson, general as well as local, are founded on my conception of the necessities shown by the physical features of the region. A glance at the map will fortify this position."

Tres Alamos, on the overland stage route, promises to be a point of local importance. There is a valuable grazing area near by, and some agricultural settlements in the valley, which, together with the stage travel, makes Tres Alamos a good point of trade. At Camp Bowie there is also the commencement of a small town, and to the south of it, Safford, on the Gila, near an old Spanish store and ranch, is likely to prove of local significance.

CHAPTER XI.

AGRICULTURAL RESOURCES.

Area of Tillable Land. Arizona and South-eastern California compared. The Colorado. The Gila and Salt River. The Santa Cruz. The Minor Valleys. The Boundary Line and South-eastern Arizona. The Colorado-Chiquito. Southern and Eastern Yavapai. Mojave County. Irrigation.

It is estimated that there are about 2,800,000 acres of land in the Territory of the best quality, with surface water to sufficiently irrigate the same by reasonable expenditure on ditches, of which not over 30,000 acres are in cultivation. There are at least 10,000,000 acres—perhaps 15,000,000 to 20,000,000—of rich land that can be reclaimed by means of artesian wells; such as, when thus made available, is sold in Los Angeles and San Bernardino counties, California, for $100 per acre and upwards, but can at present be had in Arizona for the taking; with the difference that the average depth to water would probably not be half as great as in the counties above named. Most of this is as good fruit and grape land as the best lands in southern California. Even the deserts are not continuously sandy, barren wastes, but through and across them in various directions run extensive valleys. A failure in crops is rare, and the Arizona ranches are as yet unvisited by grasshoppers. The season of growth in California is for the most part just when rain cannot be had and is most needed; but in Arizona fully half the rain falls in the hot season when it does most good, and in many localities the average annual rain-fall is double that of southern California, equalling and in one belt excelling that of the Sacramento valley and the foot-hills of the Sierra Nevada. In one of Lieutenant Wheeler's Reports of Exploration in Arizona, California, and Nevada, a comparison is made between the capabilities of certain portions of the Territory and States respectively, which brings to light certain important facts. The Arizona portion compared is bounded in longitude by the parallels of 111 deg. and 113 deg. 45 min., and in latitude by those of 34 deg. and 35 deg. 40 min., which includes the south-western portion of Yavapai county and a small strip of Mojave county—by no means the best agricultural region of the Territory, and scarcely average. The part of California and Nevada with which this is compared is the eastern portion of southern California and southern Nevada, in the same latitudes. The total area of the Arizona portion is 17,954.6 square miles; the partial area of the other is 10,283 miles. The following is the comparison:—

	California and Nevada	Arizona.
Agricultural, irrigable, and arable, per cent	2	25
Timber, per cent	6	10
Grazing, per cent	88	30
Barren, per cent	4	35

The 88 per cent. of grazing in California and Nevada is dependent on rains rarely sufficient even for grazing purposes, quite unreliable as to amount, and involving enormous losses of stock in the frequent years of drouth, which in summer is continuous and invariable; so that the difference in favor of Arizona is greater than the figures indicate, as far as these respective portions are concerned. It is true that the portion of California selected is the poorest in the State; but there are few areas in California of the same dimensions that would give a better showing as to the per centage of irrigable, arable, and grazing lands than that portion of Arizona selected. A territory that can do as well as this, differs widely from the popular conceptions, by which it is regarded in the main as a desert.

For convenience of arrangement in considering its agricultural capabilities, Arizona may be divided as follows: 1. The Colorado river country. 2. The valleys of the Gila, and of its tributaries, including the Salt river as far north as the thirty-fifth parallel. 3. The Santa Cruz valley, the isolated locations in Pinal and Pima counties, and the vicinity of the New Mexico line. 4. The Colorado-Chiquito. 5. The south-western portion of Yavapai county, surrounding Prescott. 6. Mojave county.

The Colorado river is probably unequalled in the world for the deep cañons characteristic of its upper course; but it is only when we reach Cottonwood island, some distance above Fort Mojave, in its downward course, that its banks are available for cultivation. This island is six miles in length by about one-fourth of a mile in width, and is inhabited by Payutes, who cultivate the soil with success, and support themselves almost entirely thereby. Several hundred acres of good alluvial soil in the vicinity are covered with mesquite, cottonwood and grass. Below Fort Mojave the bottom lands expand, and the river branches out into lagoons, soaking the soil. The wide valley is here twenty-five miles in length, terminating below at the Needles, a portion of the Mojave range through which the river has washed a cañon. It is inhabited by several hundred Mojave Indians, the fine corn-fields and groves of mesquite pleasingly contrasting with the surrounding dreary desert. Crops are here raised from the moisture caused by the overflow of the river. There are very few white settlers in this fertile valley. South of the Needles are several other large valleys, well suited to sub-tropical farming, and reaching in places a width of ten to fifteen miles, subject to the drawback caused by the shifting of the river bed, which could probably be remedied by engineering skill at a cost that would be small in comparison with the resultant benefits. A portion is an Indian reservation, exclusive of which the bottom lands are sufficient to support thousands of settlers. The soil is rich in the chemical combinations requisite for fertility, and only in small patches contains too large a proportion of clay. In some places it has also small amounts of chloride of sodium and sulphate of lime. The fertilizing reddish mud resembles that of the Rio Grande and of the Nile, and its quantity varies from 0.1 to 0.5 per cent. (1-1000 to 1-200) of the water, which is good to drink even when considerably colored by the mud. As compared with the above-named rivers, it contains less potassa, more phosphoric acid, and much more carbonate of lime, the presence of the latter valuable ingredient being due to the immense limestone beds through which the river flows in the upper part of its course. The following table (mud from the Colorado having been collected at Cottonwood island) exhibits a comparative analysis of the mud of these rivers:

CONSTITUENTS.	Colorado.	Rio Grande.	Nile.
Hygroscopic Water	3.27	1.890	....
Chemically bound water, soluble in Hydrochloric Acid	1.14	3.122	....
Potassa	0.103	0.284	0.166
Soda with trace of Lithia	0.074	0.064	0.022
Lime	....	1.479	1.725
Carbonate of Lime	12.50	5.190	....
Magnesia	0.69	0.080	0.046
Oxide of Iron	....	3.640	8.804
Alumina	2.26	1.308	
Phosphoric Acid	0.146	0.092	0.143
Sulphuric Acid	trace	trace	trace
Oxide of Manganese	trace	....	....
Insoluble in Hydrochloric Acid	78.1	82.55	....

The amount of mineral matter is too small to impart any taste to the water; but the water from wells sunk in the adjacent bottom land is brackish. As none of the sediments above compared contain more than traces of organic matter, it is clear that their fertilizing properties depend upon their inorganic material. Analyses of a clayey soil, six miles east of Ehrenberg, exhibit the following mechanical condition: Silt, 52.30; Clay, 24.20; Hygroscopic water, 3.65; Chemically bound water, 8.91. The chemical constituents soluble in hydrochloric acid, are as follows: Potassa, 0.283; Chloride of Sodium, 2.047; Soda, 0.182; Carbonate of Lime, 9.264; Sulphate of Lime, 1.321; Phosphoric Acid, 0.151; Oxide of Iron and Alumina, 5.160; Insoluble in Hydrochloric Acid, 77.2.

On the west side of the river, near Ehrenberg, is wide bottom land, and along the river is a rich growth of cottonwood and other trees. Skirting the bottom is a rich mesa 30 miles in length and three to ten miles in width, having no water, but producing pasturage from the winter and summer rains. The adjoining mountains on both sides are believed to contain gold, silver and copper in paying quantities. Colonel Hodge, who surveyed townships five and six south, ranges 23 and 24 east of the San Bernardino meridian, and townships seven and eight south, ranges 23 east, states that they contain about 43,000 acres of rich bottom land, (perhaps taken up, or attempted to be, as "desert land,") and that there is a timber belt on the river 20 miles in length and averaging over half a mile in width. Sloughs extending over this bottom are bordered by cottonwood, willow and mesquite timber suitable for fuel. The soil is rich, sandy loam, equal to any on the lower Mississippi, formed by the overflow of the river in May and June, after which the vegetable growths are amazing: pig-weed persistently runs up to twelve feet in six weeks, with a diameter of eight inches; wild hemp grows in abundance six to twelve feet in the same time, its fiber being similar to that from which manila cordage is made; grass simultaneously grows two to five feet; the depth of the overflow on the bottom is one to three feet, and is seven feet above low water. The soil, if kept from overflow and irrigated, is well adapted to cotton, the sugar-cane, grain, hemp, and semi-tropical fruits. A canal twelve miles in length would irrigate 100,000 acres. Below Ehrenberg the valley area is greater than above it, and the acres that, by some what expensive canals, could be rendered available for an enormous production, are counted by hundreds of thousands. This brings us to the consideration of the extent to which the Colorado river could be rendered available for irrigation. It has been appropriately remarked by geologists that the country bordering on the Colorado is the most conspicuous example in the world of over-drainage; for nowhere else do we find a stream that for hundreds of miles cuts its way 500 to 600 feet deep, through solid rock. In countries where rains are frequent, the excavations made by the rivers in their channels are, in the main, balanced by the mud of the washings from their shores and by their tributary streams, which is again replaced by a liberal growth of vegetation. But the Colorado, supplied by streams from the mountains where rain and snow are abundant, cuts its way though a rainless and therefore desert region, in which the only changes are those resulting from the direct action of the atmosphere, so that no appreciable debris of any kind is furnished to fill up the excavations continued through millions of years, and only limited by an approximation of the level of the river bed to that of the waters of the Gulf of California. Lieut. Wheeler estimates the area of land drained by the Colorado river and its tributaries to aggregate 242,065 miles, mostly still owned by the Government. Yet, as he states, there is no law to protect "the rights of settlers on streams as against prior occupants, nothing now preventing the diversion of any water of any stream, * * * in this and all other drainage basins of the western States and Territories, by interested proprietors whose *locus* may have been selected at a point most likely to control the maximum of the waters of the immediate watershed": all of which is a serious drawback to the settlement of large areas of naturally productive Government lands.

A flow of one cubic foot per second is ample for the irrigation of 200 acres. At Stone's Ferry, near the mouth of the Virgin, in August, 1875, the flow was ascertained to be 18,410 cubic feet per second; at Camp Mojave in the following month 8,680 feet; at Fort Yuma in March, 1876, 7,658 feet per second; but at other seasons, particularly in May and June, the quantity of water is estimated to be double these amounts. Taking the above flow at Fort Yuma as a basis, the quantity of water is sufficient to irrigate 1,531,600 acres, which, with that soil and in that climate, would easily support a population of one million white men, women and children. Except for the valleys of the river and some of the lower mesas, irrigation from the river is regarded by engineers as impracticable above Fort Yuma, because the mesa banks are so much higher than the river bed. The government surveyors especially assigned to the duty of investigating the subject, report that the only practicable point at which the river could be diverted from its course is near Fort Yuma, the best place being at Hanlon's Ferry, on the Mexican line, where the river is 120 feet above sea level; thence in a westerly course five to ten miles south of the line, a series of levels are struck varying from fifty-four and a half feet to 113 feet. At about 115 deg. 37 min. longitude, the United States line is struck 100 miles west of the starting point, and soon afterwards that large area of the Colorado desert below sea level, which has been estimated to be 1,600 square miles, (1,024,000 acres) now traversed by the Southern Pacific Railroad, is reached. At much additional expense the channel could be cut entirely through American soil. The surveyor, however, was of opinion, that from Seven Wells, on the 115th deg. parallel, about thirty-five miles from Hanlon's Ferry, it could be taken northward without deep cuttings, in a depressed area but little if any above the level of the water at Hanlon's Ferry, and the same result accomplished as by the other route. The river at Hanlon's Ferry, it must be recollected in considering these levels, is itself over a hundred feet above tide water. The Coahuila valley, California, which constitutes a large portion of this low area, is believed, on geological grounds, to have been a large lake within a thousand years, of which the Indians there have still a tradition.

But now let us follow this summary of what may be possible, though perhaps at too great a cost, by a reference to the actual. Between the Colorado and Gila rivers is a broad alluvial deposit, in shape something like a flat-iron, at the apex of which the two rivers meet; it contains in all 40,000 acres, every foot of it cultivated by irrigation. Occasionally there would be a tract showing alkali, not from deposits, but made so by the overflows. The arrowhead, as it is called—clumps of slender, reedlike shoots growing from a common root to the height of six or eight feet—were scattered all over, interspersed occasionally with the greasewood and mesquite tree; the latter a very useful feature of the Arizona valley and mesa land.

The owners of the San Ysidro ranch, in this locality, are José M. Redondo and his brother. The first-named has been in the Pacific States since 1849, and in Arizona since 1862. This ranch contains some 1,500 acres. The greater portion of it is on the railroad lands; two quarter sections are being preëmpted, and one section is to be taken up under the Desert Land law. Mr. Redondo has been trying to irrigate continuously since 1862, but though he spent considerable money, he was not successful till this location was selected. The canals on the place are at least twenty-seven miles in length; the main ditch is nine miles, the connecting one six, and the distributing ditches about twelve miles in length. The work was commenced in 1871, and at least $25,000 were spent before a cent was realized. Last year was the first one in which any profit was realized, the net returns being about $21,000, of which some $6,000 were profit. The returns for the present year will be, it is estimated, about as follows: Barley, 500,000 pounds; wheat, 300,000 pounds; hay, 500 tons. The grain will sell at three cents per pound, realizing $24,000. The hay will average $40 per ton, or $20,000. Nearly or quite one half of this will be profit. Some 500 head of stock, chiefly cows, are also on the ranch, though they are generally turned on the river bottom. The Messrs. Redondo are enthusiastic over their prospects. Their market is a safe one. The fort, the mail contractors, and the freighters and immigration, and now the railroad also, make an active demand for all that can be raised. They are making preparations to live on the ranch. Two large granaries and other buildings are already constructed; others and a large adobe house are being built. One of the experiments they are making is the cultivation of the sugar cane. Last year they had twenty acres, and would have endeavored to make sugar but for the loss of a mill which they had shipped. They made, however, some 600 gallons of capital molasses. This year they have thirty acres in cane, and have a small mill all ready. If successful, they propose to enter on the cultivation extensively. They have also tried cotton, and find that it will do exceedingly well. It grows very rank. The ranch employs some sixty hands during the busy season, and half that number in ordinary times. The wages paid are, for ordinary labor, $20 per month and rations, which is considered equal to $30. The "major-domo," or overseer, receives $95 per month. A blacksmith and carpenter are employed regularly. Figs, oranges, dates and ash trees have been set out and thrive well. Two-year-old trees were filled with figs, and vines of the same age already loaded with fine grapes. There is not the slightest doubt that all such things thrive exceedingly well. Strawberries and other small fruits and vegetables can be had every month in the year. It will be of interest in California to learn the fact that the sheep growers and cattle men of the southern portion of the State are making arrangements for pasturing in this Territory. A large number of sheep will be brought here, now the railroad is running to the point.

The Salt river valley, twenty-five miles in length by about fourteen in width, of which Phœnix is the business center, recently contained a population of about fifteen hundred, which is rapidly increasing, and with its estimated quarter of a million of acres of rich, alluvial soil, capable of producing twenty-five to fifty bushels of grain to the acre, ought easily to support 50,000, were there a sufficiency of irrigating ditches and artesian wells to fully utilize its natural capabilities. 8,000 to 10,000 acres are now under cultivation, principally in wheat and barley, of which about 6,000,000 pounds have been produced this year. The farms consist mostly of 160 acres, nearly all owned by cultivators. A correspondent of the *Arizona Miner* observes: "It is well for Phœnix that some of the land cormorants of California were not among the first settlers of Salt river valley. For instead of beholding, as you do now, on every quarter-section a neat adobe cottage, with the family of the peasant proprietor or small farmer; about half a dozen elegant residences, with their bloated and pampered inmates, would constitute the population, with hordes of Chinamen to make it more revolting." Near Phœnix an old canal eight miles in length by twenty feet in width has been discovered, which has been, or is being, cleared out. The remains of this and many others, together with numerous mounds whose surfaces are covered with fragments of pottery, prove that a race skilled in husbandry, irrigation, and manufactures many years ago appreciated the fertility of this valley, leaving behind them no other records than their work.

The Miller Canal, commencing twelve miles below Camp McDowell, at Shortell's Station, is to cost $20,000, in $200 shares; will be thirty feet in width by four feet in depth, and carry 20,000 inches of water—a quantity sufficient to irrigate 20,000 to 40,000 acres. In the same vicinity, near Maysville, above the Tempe, a Mormon colony has settled, concerning whose operations a correspondent of the *Miner* writes: "The work done by these people is simply astounding, and the alacrity and vim with which they go at it is decidedly in favor of co-operation or communism. Irrespective of capital invested, all share equally in the returns. The main canal is two and a half miles long, eight feet deep, and eight feet wide. Two miles of small ditch are completed, and four more are required. Their diagram of the settlement as it is to be represents a mile square enclosed by an adobe wall about seven feet high. In the center is a square or plaza, around which are buildings fronting outward. The middle of the plaza represents the back yards, in which eleven families, or eighty-five persons, are to commingle. * * They are intelligent, and all Americans." Besides grain, which is worked up into flour for several mills, abundance of peaches, grapes, tomatoes, melons, and sweet potatoes are raised in the valley; also, some sugar-cane, cotton, and tobacco. There are, too, prospective hints about oranges and olives. Irrigation is indispensable; the summers are very hot, and generally very dry.

The road from Camp McDowell to old Camp Reno, near Tonto Creek, is very rough, and some of it through Reno cañon nearly impassable for horsemen. It winds circuitously around the Four Peaks. There are two water stations, one at the base of Sugar-loaf Mountain, and the other at Sunflower. The cattle range is excellent and extensive. There is a large ranch at old Camp Reno, and smaller ones in the vicinity. From the summit of Reno hill is a magnificent view of Tonto basin, and at every turn of the cañon the scene changes like the figures of a kaleidoscope. On leaving Reno the trail runs parallel with Tonto creek, through brush, rock and sand for some miles, until Robinson's ranch, *en route* to Globe City, is reached. He came from California some time ago with 2,000 sheep, picked out a large flat at the foot of the Four Peaks for herding, and says his sheep never did better. From Robinson's to McIntosh's, at the Salt river crossing, is about eight miles. Here is some excellent farming land, irrigated by mountain springs, with plenty of grass and good crops. At Camp Pinal, now Pinal ranch, on a tributary of Salt River, 3,000 pounds of potatoes were raised last year, which found a quick market at the mines at 10 cents per pound. From Wheatfields, on Pinal creek, to Globe city, there are ranches all along the road, which is perfectly level and in good condition. The products of these ranches find a ready market among the fifteen hundred miners of Globe district.

Two miles below the mouth of Agua Fria, and but little more below the confluence of the Gila and Salt rivers, a ditch has been taken out of the Gila by a company from Prescott, who are themselves cultivating, or will cultivate, the land thus rendered available. The soil is a fine sandy loam, covered with a heavy growth of mesquite, sage, arrowweed, etc.

A survey of public lands on the Gila of fifteen townships, extending from Oatman's flat, (118 miles above Yuma, and 30 miles below Gila bend) to a point three miles west of Mohawk station, Yuma county, 52 miles west, shows about 600 square miles of valley land available for settlement; west of which is another tract of about half the dimensions, considered to be largely similar in its character to the surveyed portion. This large area is on both sides of the river, but mostly on the north side. The Gila bottom there merges imperceptibly into the foot-hills, and has an average breadth of from five to ten miles. Its soil is principally alluvial, and will produce two crops yearly, as does the Santa Cruz bottom at Tucson. Irrigation is easily effected. The river there averages 600 feet in width, and is three to five feet in depth when there is no rain-fall and no water from the mountains. The banks along the whole of this tract are so low and sloping as to afford unusual facilities for the construction of ditches. Excellent crops of wheat, barley and vegetables are grown at Mohawk station, but very few occupants of the soil have as yet settled on this tract, which appears to be capable of producing all temperate and semi-tropical productions, and is directly on the track of the railroad, completion of which cannot long be deferred. In the vicinity of Florence is an extensive tract of rich bottom and second-mesa or table-land, on which are now grown the cereals, alalfa, the *sugar-cane*, and vegetables and fruits generally, including orange and lemon trees. Fruit culture in the Gila valley is extensive. Cottonwood, ash and locust are abundant. Mr. Wheat, farmer, believes that a few acres of tobacco would be worth ten times the number in wheat. He has ten acres in flourishing sugar-cane, and all the sugar and molasses he uses are from cane that he grew last year. A new irrigating canal eight miles in length is being constructed. In the valley of the Gila, as in that of Salt river, a long-extinct, numerous, industrious and highly civilized race once cultivated the soil, as shown by the ruins of vast acequias, or irrigating ditches. The crop of grain on the Gila for the year 1877 is estimated to have been about 3,000,000 pounds in quantity, and $100,000 in value; there was also an abundance of hay; orchards, vineyards, vegetable gardens and fields show a very rapid advance on preceding seasons. Dr. Dumont, ten miles from Florence, had a crop of potatoes six to seven inches in length, that when boiled burst open, mealy and mellow. On many other farms excellent Irish potatoes are raised. Grass of excellent quality is found on the mesas.

The valley of the Gila, though cultivatable along most of its course, is not available for semi-tropical productions in its upper part, on account of October frosts. The White Mountain Indian Reservation (San Carlos) interferes with a continuous white settlement above Florence, as the Pima and Maricopa lands do below it. These latter Indians have cultivated wheat, corn, pumpkins, melons, etc., for centuries, and have always been self-supporting, as well as the Papagoes further south, who however depend principally on stock. Probably no people produce finer wheat than do the Pima Indians. In a report made by Dr. Rothrock, of the Wheeler expedition, of a trip from Fort Wingate to the Santa Rita mountains, the following observations occur respecting the Gila valley, at and above Camp Goodwin, or Camp Thomas: "The valley of the Gila where the trail crosses the river, is 2,517 feet above the sea; hence, in coming from Camp Apache, the traveller descends 2,408 feet. Camp Grant, about 30 miles south, in a direct line, is 2,336 feet higher than the river, so there is a marked sloping of the country from north to south towards this stream, which fact must not be lost sight of in considering its peculiar climatic conditions. Its sandy soil, its rapid evaporation, the dryness of the ridges parallel to the river, together with its greatly lower altitude, impress of necessity upon the flora the peculiarities which contrast so strongly with that of the surrounding region. Yet this valley in many places produces fair crops of barley and corn. There is enough of water for irrigation of the adjacent lowlands. At the very point of crossing there is evidence in some ruins that a large population subsisted on the productions of this region in the past. At Camp Goodwin (abandoned as a military post) was found (1875) a luxuriant field of potatoes; and melons, onions and cabbages of the best quality, swelled the list of productions. Grass was scarce, but by clearing away the growth of rank weeds that infested the ground, and protecting it from stray animals, the soil would yield good crops of grass or any of the cereals. This place is capable of being transformed into a garden. Its worst feature is the unhealthfulness of the climate. In fact, it was on this account abandoned by the Goverment authorities. Drainage would do much towards improving the location in this respect." More recent developments justify his views. A prosperous village and settlement have recently sprung up at Camp Thomas, in the vicinity, from which no complaint of unhealthiness is received. Mines are being developed at no great distance. Two companies of soldiers are stationed at Camp Thomas. The rainfall amounts to nearly 33 inches annually, probably the largest in the Territory, amounting to 3.21 inches in the spring, 7.20 summer, 10.52 autumn, and 11.85 in the winter. The Pueblo Viejo, still further up, has, with its tributary valley of Ash creek, (mentioned in the foregoing extract) and others, 100,000 acres of productive farming land. The altitude is about 4,000 feet above the sea. It contains numerous and interesting ruins. The climate is here subject to great extremes; the temperature at the mouth of the Rio Francisco in August ranges from 50 deg. to 105 deg., in the beginning of October from 30 deg. to 90 deg., and at the close of the month from 15 deg. to 60 deg. But the hot summers enable all crops of the temperate zone to ripen before frost in the fall. On the uplands and further up the valley itself, near the line of New Mexico, the daily variations are much less and the frosts later. Still further up its course, within the borders of New Mexico, the Gila river has upon its margins much good agricultural land, but the bottom lands on its head-waters are said to be pebbly. The bottom lands of the Gila generally are quite rich in potassa and phosphoric acid.

The region of the Francisco river, a tributary of the Gila, near the line of New Mexico, is good for grazing and timber, and in general rich soil. The timber is black walnut, sycamore, pine, ash, cedar, piñon, cottonwood, juniper, etc. The stream abounds in fish, and the woods in bear, deer and turkey. The upper part of the Rio Prieto and Bonito creek, also tributaries of the Gila, in the same vicinity, is a high, rough, rolling mountain country, with little water. Some of the mountains are covered with giant cacti twenty-five to fifty feet in height, and four feet in diameter. The scenery is of imposing grandeur.

The San Pedro river is a tributary of the Gila, its mouth being between Florence and San Carlos, and its source in the Huachuca mountains, near the Mexican line. These mountains are believed to be rich in silver, with some gold. There is good land, good timber, and excellent range for stock. The road from Sulphur Springs to San Pedro upper crossing, about forty miles north of the line, as it nears the river passes through dense growths of acacia constricta, mesquite and dwarfed pines. Quite a number of cattle roam over the adjacent region. At Tres Alamos, in its upper course, the proprietor of the hotel is also a dairyman, and sells (or sold) good butter for one dollar per pound. In an orchard near the house are apple, fig and other trees; also grape vines. Seven miles below is a farm occupied by Mr. Frank Long, who, from twenty acres of barley, in 1877, harvested 55,000 pounds; and from five acres of wheat, 12,000 pounds; forty in corn made only 20,000 pounds, because of a scant supply of water, resulting from insufficient fall to the ditch, which was two and a half miles in length. Here, and at the farms below, the cut-worm ruined the potatoes. Three miles below is a stock-farm and ranch belonging to L. Apodaca, whose ditch, recently finished, cost $1,000. Six miles further down, Sacramento Laron raised a large crop of barley. Juan Borquez, about a mile below, has eighteen acres of corn, a small garden, and half an acre of potatoes—the only potatoes on the San Pedro that have escaped the cut-worm. Everything is in fine condition, and he had more water than he could use. Two and a half miles further down, Wm. Harndorff had about forty acres of fine corn. Ruiz Mendoza raises, one mile below, large crops of wheat and barley; also some corn and beans. Along the whole distance of twenty miles down from Tres Alamos there is abundance of water, grass and timber. The soil, from the detritus of the adjacent mountains, is well provided with lime, potassa and phosphoric acid—all well-known requisites to fertility. Some of these bottom lands have been cropped heavily since 1857 without the use of manure. In the San Pedro and lateral valleys are said to be about fifty thousand acres of good farming land. The soil is reddish gray, not heavy or clayey. Its physical analysis gives, of one hundred parts: sand, 14; silt, with a little clay, 75.40; hygroscopic moisture, 6.09; chemically bound water and organic traces, 4.51. Beans and melons are injured by rust. Corn is planted in the middle of April, and ripens early in October. Late frosts are frequent. Irrigation is needed about once in twelve days. Below Ruiz Mendoza's the river is mostly taken up by stock-men from Tucson. The rain-fall is about ten inches annually. About fifteen miles above the Gila, Camp Grant was at first located, but removed, on account of malaria, to its present situation.

This concludes the description of the agricultural regions of the Gila and its tributaries, the most extensive in Arizona—the main stream flowing from the cool, high mountains of its eastern border to the hot Colorado valley, which is its western limit. Our third division, the Santa Cruz valley, is smaller in extent, but equally productive in proportion to its area, more compact, and all of it adapted to semi-tropical fruits, as well as to the vegetables of the temperate zone; from its upper portion Irish potatoes were recently retailed in Tucson at ten cents per pound. In 1858 Major Steen established the military post of Fort Buchanan, at the foot of the Santa Rita mountains. Camp Crittenden was subsequently built in the immediate vicinity, but has been abandoned as a post for several years.

From the establishment of Fort Buchanan the valleys of the Santa Cruz, Sonoita, etc., began to be extensively settled by Americans, who engaged in the culture of grain and hay, and in cattle-raising so successfully, that although in 1858 hardly 1,200 acres of land were in cultivation, except the Papago fields, yet as early as 1861 very little forage or flour had to be brought from Sonora for the use of the troops; and now in the valley of the Santa Cruz and its tributaries about one hundred thousand acres are in cultivation. A portion near Tucson has been under uninterrupted cultivation for more than two centuries, with no diminution, so far as known, of its productive capacity. The Sopori ranch, south of the old Mission of San Xavier del Bac, has been described in Chapter VIII.

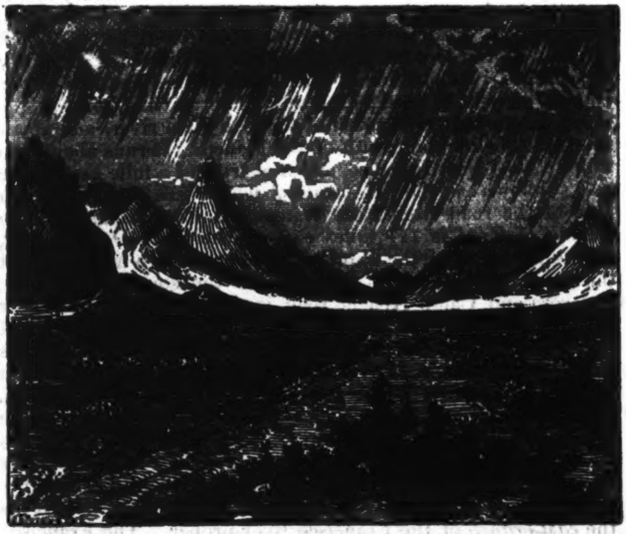
Finer farming land than is seen in the Santa Cruz valley on the road to Tucson is rarely found. Here and there the river takes a turn underground, but water can always be obtained by surface digging; and for more than a century this valley has produced two crops a year without enrichment. The grazing on the slopes each side of the valley is superior. Westward from the Santa Cruz valley to the line of Yuma county extend grassy, rolling plains, intersected here and there by isolated mountain ranges, which have been described in the eighth chapter.

Dr. Rothrock, previously quoted in reference to the Gila valley near Camp Goodwin, continues his narrative substantially as follows: "Between Camp Goodwin and Cottonwood (nineteen miles) the agricultural resources are reduced to a minimum. Grass abounded on the hill-sides which would, during the portions of the year *in which water could be found in sufficient quantity*, make this a good grazing country. There is a fine belt of cottonwood, ash, and buttonwood along the creek bed, but it is being rapidly used. A few miles south of Cottonwood the trail turns off to Camp Grant. At one or two points in the distance of twenty-five miles, water can be found for camping purposes. There is no lack of grass, and some timber too exists in the arroyos, and on the adjacent foot-hills of Graham peak. The valley in which Eureka is situated, without having a constant flowing stream, appears to have enough of water to meet all the demands of a large herd. The ground is at several places quite boggy, indicating a ready means of obtaining more water than appears on the surface. In fact, it is a sort of drainage basin for the neighboring hills. A strip of fertile soil exists above the ranch. Timber of good quality can be had in abundance within a few miles. Without having anything to make this an especially attractive home, there is no doubt that it will yet be an important point in the stock-raising interests of the country." Another explorer thus describes the plain of Camp Grant: "The Caliuro mountains to the west, the Graham mountain range with Camp Grant to the north, the Chiricahua mountains to the east, and the Mexican boundary to the south, inclose an extensive plain of at least 800 square miles. Standing near Camp Grant, on the base of Mount Graham, one can overlook the whole region. A splendid mirage makes its appearance on the southern horizon every clear morning, in the form of a transmuting mountain chain. Adjoining this plain to the north-west is Arivaipa valley, (where coal has been recently discovered) and to the north-east a level stretch of country, bordered by the Peloncillo mountains on the north. This vast area is without either running streams or timber, but covered to a great extent with fine grass. The soap-weed, the cactus, the sage-brush, and the grease-wood are but little found here. There are several springs of good water on the plain—Eureka springs in the north-west and Croton and Sulphur springs on its southern portion. Experiments have shown that *water is reached almost everywhere on the plain at a depth of ten feet*, and it is therefore probable that certain crops could be raised without irrigation were the same planted at a depth of about one foot. [Experience of the Moqui Indians proves this view to be correct.] The surrounding mountain ranges are well timbered except the Caliuro range. The little mountain streams sink soon after leaving the plain. To the west of the Dos Cabezas mountain a few square miles are covered with white salt efflorescences, consisting chiefly of sulphate and carbonate of soda. * * An abundant supply of water is procured at one ranch (Hooker's) from a well fifteen feet deep. The soil is of the proper physical qualities, containing all the requisite chemical constituents; excepting a narrow strip near Croton Springs, where it is heavy and clayey. At some places below Sulphur Springs (where the water is perfectly drinkable, notwithstanding the name) it is perfectly saturated with humidity."

Approaching Sulphur Springs from the east, the road lies for miles through a dense growth of saccatone grass, of far less value than the shorter grama that fairly covers the ground at the springs, but indicating good soil. Mt. Graham will be described in the chapter on "Military Posts." Its timber supply is magnificent in quality and variety, as well as liberal in quantity. In the winter months there is a heavy snow-fall on the higher portions of Graham peak, which is over 10,000 feet above the sea, and in summer its thunder storms are terrific. "From Camp Bowie (sixty miles) the road lies over a rolling plain in all respects similar to that about Grant. A spur of the Pinaleno range gradually disappeared toward the southeast, in the direction of a similar one advancing from the Chiricahua range. This tendency to union of the two ranges leaves the country dotted over with low, disjointed mesas, which rise above the general level of the plain as islands do from the ocean. The soil was largely made up from detritus from the adjacent ranges, and is in itself fertile enough, but water can usually be found only at two or three points along the road. Here and there dry arroyos run from the hills to the plain. At Camp Bowie, which is situated on a limestone formation, there is a remarkable change of flora. The dry hill-sides still had their mescal plants": besides other new plants there was a remarkable variety of ferns. (For further details as to this locality, see description of Camp Bowie in "Military Posts.") "Looking down the cañon from Camp Bowie, a beautiful view may be had of a portion of the San Simeon plains, literally strewn with flowers. The valley of the San Simeon is about 25 miles in width, and contains much fine grazing and some agricultural land. It is covered with grama—a grass rivalled in nutritious quality only by the mesquite grass of Texas. Southward from Camp Bowie, at the base of the Chiracahua mountains the grass becomes abundant, the vegetation more varied, and the hills are covered with a fair growth of pine and oak. It is one of the most desirable cattle ranges in Arizona; the water is sufficiently abundant for herding purposes, though it does not extend far out of the mountains into the plains during the dry season." The Chiricahua mountains are composed of syenite, schists, palæozoic strata and porphyry. The Dragoon mountains, forty miles eastward, are well supplied with springs, and the grass is nearly inexhaustible.

Colonel Hodge thus describes the country north-easterly from Camp Apache: "From Camp Apache to the Zuni Pueblo, N. M., is about 125 miles. The course is north of east. For twenty miles the road passes up the valley or depression of the north branch of White river, and thence across the White mountains, which is an elevated plateau of 7,000 to 8,000 feet altitude. There is some good agricultural land along the north branch of White river, a portion of which is cultivated by Indians. The river most of the way follows a cañon, with steep abrupt cliffs on either side. The whole country from Camp Apache to the foot of the mountains on the east and north-east is covered with a fine growth of pine, in numbers sufficient to supply all Arizona with lumber for the next century. This belt of pines is at least 40 miles wide, and extends north and north-west for hundreds of miles. Clear, cold springs are abundant at short intervals all through the mountains so far as traversed by me; many little springs are on the summit, where a great abundance of grass grows."

United States Surveyor Chandler Robbins, who made the survey of the boundary line between Arizona and New Mexico, has embodied the results of his observations in a report from which the following are extracts: "The boundary line is not, as is frequently supposed, 109 deg. west of Greenwich, but 32 deg. west of Washington, which is 109 deg., 2 min. 59 sec., 25 thirds west of Greenwich—a difference of nearly three miles. Its position in relation to natural features of the country may be defined as follows: The starting point at the north is one-half mile south of the San Juan river, and about four miles below the mouth of the Mancos. It runs about two miles east of Fort Defiance, and a quarter of a mile east of the rocks known as the 'Haystacks,' which are near the north side of the road from Fort Wingate to Fort Defiance. The Pueblo of Zuni is 11¼ miles east of the line; Deer Spring, on the west side of the Zuni river, is about two miles west of the line. The Cienaga Amarilla, on the south side of the Tulerosa and Camp Apache road, is about a quarter of a mile west of the line. The east end of the Escudilla peak is about four miles west of the line, which, on entering the mountains to the south of it, runs over the top of the most prominent in the range, situated about ten miles south of the Escudilla. Twenty-six miles further south are Four Peaks, very close together, plainly visible from any direction; over the westernmost of these the line passes. After passing the Four Peaks we come in sight of what I supposed, and is laid down on my map as, the Francisco river. * * * * This river is the *east branch* of the Francisco river proper. The Francisco river heads on the south side of the same mountain peak in the White mountains, near where the Little Colorado leads to the north. The former river then flows in a southerly direction, and is west of the line all the way. The line then crosses the Gila river about five miles west of the bridge, and about one mile east of Little Ranch. It then passes directly over Steen's Peak and into the San Simeon valley, between the Chiricahua and Peloncillo mountains, passing about a quarter of a mile west of John Brisbie's ranch house, leaving most of the Cienaga in New Mexico. It then continues up the valley until it strikes the Peloncillo mountains, where they turn westerly, and passes through these mountains into the Guadalupe cañon; the last monument being placed on the boundary line between the United States and Mexico, about one mile south of the cañon, the whole line being 390.60 miles in length. In the Navajo reservation we passed through a fine grazing country, especially in the Tunicha mountains, which are all well watered by springs and covered with pine. Between Fort Defiance and Escudilla mountains the country is very dry and sandy, covered with scrub cedar and piñon. The Escudilla mountains produce very fine grass, with abundance of water and timber, mostly pine, oak and spruce; there are ash, maple and cottonwood in the cañons. Indications of copper ore were found in these mountains in the line near the 219th mile, on a high, rocky ridge between two valleys, each containing plenty of running water. There was also a narrow seam



SUGAR LOAF MOUNTAIN.

showing indications of silver, found in the main cañon running south to the east branch of the Francisco river, about four miles north of the river and one mile east of the 256th mile of the line. The line enters the Escudilla mountains at the 207th mile, and crosses the west peak of the 'Four Peaks' at the 241st mile, and the east branch of the Francisco river at the 260th mile. From the Francisco to the Gila is a rough, broken, barren country. The valley of the Gila is very good land and quite productive, producing corn, wheat and all kinds of vegetables; situated as it is, near the mining districts of Clifton, Ralston and Silver City, and being the only agricultural land near, it will soon become valuable. The plain south of the Gila produces good grass, but we found no permanent water until we struck the San Simeon. The Guadalupe cañon has a running stream in it, also abundance of grass and timber, mostly cottonwood, with walnut, sycamore and ash."

Dr. Rothrock, U. S. A., of the Wheeler exploration, in the report for 1876, thus describes the White mountain region:

"Arizona is, emphatically, a land of contrasts in scenery; its tropical climate either parching the soil and vegetation, or, under a fair supply of water, causing the flora to deck the surface with a luxuriant covering of verdure. Nowhere is this statement more strikingly true than in the Sierra Blanca and the adjoining plains to the south. On the latter the *ensemble* of the vegetation is dwarfed and hardened from the aridity of the soil and the rapidity of evaporation. In the mountains, however, dense forests alternate with well-watered glades, covered with a luxuriant growth of grass and flowers. The succulent tissues of the herbaceous vegetation appeared by contrast with the harder plants of the plains to show an excess of vitality; and an abundant nutrition, expansion into leaf, instead of contraction into the least possible evaporating surface, is characteristic of the rank, luxuriant growth of the Sierra Blanca. Rising from an altitude of 5,000 feet above the sea to 11,388 feet, and between the thirty-third and thirty-fourth parallels of latitude, we have climate superimposed on climate, from one as dry and hot as that of Sahara to a warm-temperate, a temperate, and a sub-alpine. The flora of the region ranged from the cacti and acacias of the lower grounds to the asters, goldenrods, and piñon pines of the middle; and after crossing the belt of the *Pinus ponderosa* and large firs, disappearing with dwarfed firs and a helenium on the summit of the Sierra Blanca.

"Standing on this elevated peak and looking over the surrounding region, one of the most striking views on the continent is unfolded. Ridges run in all directions from this culminating point, and descend through a stretch of miles like so many radii in an immense circle. They start from a mountain mass of infinite grandeur, and dwindle out on the grassy flats from 2,000 to 4,000 feet below. Between them are well-watered valleys, producing grass enough for all the herds of the Territory. Plains rich in all the glory a wealth of autumn-coloring could confer on their herbaceous vegetation, belts of golden-colored cottonwoods, deep and somber forests of evergreens, contrasting, yet harmonizing, combined to complete this perfect landscape. The impress upon the mind of such a view is final, and can never be forgotten. Where the ridges proper ended, the general slope of the country had been cut into cañons, each a tributary channel for carrying the torrent of water made by the melting snow to the main stream. Erosion could here be detected, illustrating to us the wonderful history of our western domain. The mesas thus left between the cañons were topped with the ever-present trachytic overflow. Water and fire, each supplementing the other, had impressed the final features on the country."

From the summit of the Sierra Blanca, looking eastward, (he says, in another report) mountains of less altitude with valleys between them rise one beyond another for at least sixty miles, most of the area being valuable timber, grazing and farming lands. Above 7,000 feet is too high for agriculture, but the best timber and range for cattle in summer. At Willow Spring, 7,195 feet in altitude, snow is occasionally several feet in depth. There is enough pine timber on the Sierra Blanca to last the whole territory for several years. The *pinus ponderosa* reaches a height of seventy feet; some firs are higher; the oak, resembling white oak, is branchy, close-grained, and solid; bunch and grama grasses are luxuriant everywhere. "The district would, in any portion of our dominion, be regarded as one of unusual promise. It is one of the most inviting portions of our country yet remaining for civilization to occupy. "*Settlers will flock to occupy this region.*" Already there are many large flocks of sheep in the White mountains, and a few herds of cattle, including some cows of the finest stock in Missouri.

The Mogollon mesa, ten to fifteen miles in width and 7,000 feet altitude, was a source of many former rivers, as shown by such cañons as that of Big Dry Lake, seventy miles in length by 200 to 400 feet in depth, heading in a small creek that sinks in the sand; Chevelon's Forks, and Cedar and Carrizo creeks head in this mesa, and the Tonto Basin—a deep depression—borders it to the south. The carboniferous strata predominate, but it is extensively covered by basaltic eruptions. Here are many forest meadows and fine valleys, suitable for farming and stock-raising. From August 16th to the 20th the temperature at sun-rise averaged 54 deg.; at 2 P. M. 76 deg.; at sun-set 63 deg. A specimen of soil from the grassy meadow near Big Dry Fork, when the vegetation is luxuriant and the meadow bordered by gigantic pines, gave of sand, 42.20; silts and clay, 37.98; hygroscopic moisture, 10.97; humus and chemically bound water, 8.84. From chemical analysis the soil appeared to be a fair average. The best soils contain 0.5 per cent. of potassa and 0.2 per cent. of phosphoric acid, and such soil is found for a great distance along the eastern slopes of the Mogollon.

In the report for 1875, Dr. Rothrock sums up the results of his observations as to agricultural capabilities and sanitary conditions in south-eastern Arizona, as follows: 1. The soil, particularly that resulting from the decomposition of volcanic and sedimentary rocks, possesses the elements of vegetable growth, and with enough water will produce crops. 2. That wherever there is water enough for herds, the adjacent land can be utilized for grazing. 3. That the forests, though localized, are abundant. 4. That large areas, now abandoned for want of water, could be cultivated by a system of tanks for its storage. 5. That by agriculture and forest culture the excessive waste of water in surface draining and rapid evaporation could be lessened. 6. The prevailing diseases are of less than usual fatality, and can in many cases be absolutely prevented or readily cured; and that these diseases will diminish in frequency and severity as the country is brought under cultivation. He also claims that the effects of cultivation generally would be to utilize the water and prevent floods; also to diminish escape by evaporation: that the seeds of nutritious native grasses, now growing so sparsely, could be, by sowing and care, made to furnish a turf, the interlacing of which would confer the needed protection to the soil against washes; also on death and decay increasing its fertility: that since the advent of the Mormons in Utah, Salt Lake has risen twelve feet, and is still rising, as are all the waters in that Territory: that the records of rainfall at Camp Goodwin, Old Camp Grant, Camp Lowell, Tubac and Fort Wingate, New Mexico, prove that in south-eastern Arizona, and immediately adjacent, the rainfall is not only greater than in the great California valleys and southern California, but that more of it falls in *summer* when it most accelerates growth.

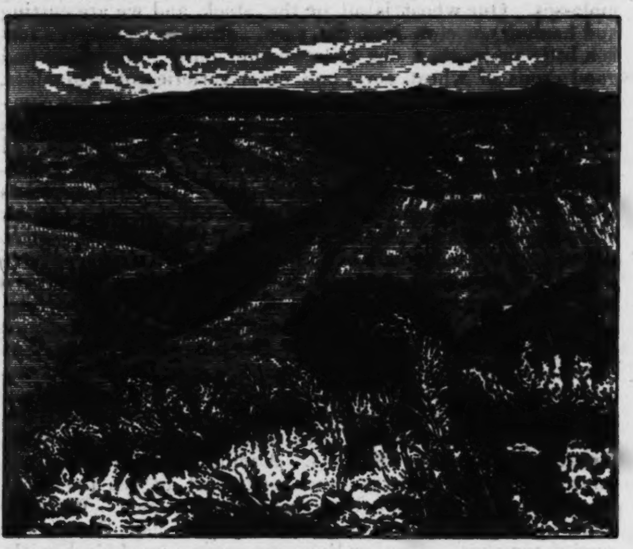
We now come to the valley of the Colorado-Chiquito, whose head waters are in the White mountains. A small settlement, called St. John's, about twenty miles west of the line of New Mexico, and seventy miles north from their summit, is the nearest settlement known to the region so graphically described by Dr. Rothrock. At Deer Spring, (as he states in the report for 1875) a tributary of the Little Colorado, near the line, in latitude 34 deg. 50 min., piñon and cedar cover the lower grounds, and larger pines the higher. For several miles south the valley is from two to ten miles in width, hemmed in by mesa walls, at whose base there are springs at several points, and a fair supply of timber skirting its edge. The soil, though in some places alkaline, is absolutely black with decaying vegetable matter, seeming in point of fertility like a vast mass of compost; it is certainly a fine situation for herds at any season of the year, and probably a good farming country. From the abundance of water on the sides of the valley, it is probable that not only surface but artesian water could be had at almost any point. Twelve miles south of Deer creek there is a waste of sandhills to the Little Colorado, with an occasional clump of piñons; the river is in the main a deep, narrow stream, with water enough for irrigating purposes; hence the immediate valley may be regarded as belonging to the domain of agriculture. Nearer its head the river drains a valley that produces fair crops of corn and barley. The proximity of the Sierra Blanca, (White mountains) with their accumulating snows melting away until late in the spring, and the frequent showers in July and August, make a certainty of the water. Near the base of the mountains irrigation might almost be dispensed with, so frequent are the showers. At Cave spring, fifteen miles south of the Little Colorado, the water flows from beds of basaltic lava, as is the case with the best springs of the country. Here is a fertile meadow, with sedges and rushes. The adjacent hills are well covered with bunch and grama grasses. Piñons are sparsely scattered. It is a good grazing center; and hence to the bottom of the timber belt of the Sierra Blanca the road is through a region in which thousands of cattle might find enough forage most of the year, and water within easy reach. General Kautz, commanding Department of Arizona, is of opinion that in all of the cañons and valleys connected with the Little Colorado, water could be obtained within fifty feet of the surface.

Lieut. Wheeler, in his report for 1876, defines the term "park" as applicable to "a series of natural objects picturesquely grouped in areas of considerable extent," and accords the palm as such to "the little valleys of drainage of the Upper Colorado-Chiquito and the heads of Salt River." Sunset Crossing and other parts for thirty miles above are being extensively settled by Mormons. It is on the road from Prescott to the termini of the Denver and Rio Grande and the Atchison, Topeka and Santa Fé railroads, now likely to become one of the routes of supply for that town. The geological character of that region is thus defined by A. R. Marvine in the geological portion of Wheeler's report: "In the vicinity of Sunset Forks (a few miles west) the eastward inclination of the upper carboniferous limestones, which had formed the floor of the plain, being greater than that of the surface, they disappeared beneath it, becoming covered with red soil and flat mesa remnants which give an indefinite rolling character to the general incline. These low hills are composed of dark-red shaly triassic sandstone, often ripple-marked and gypsiferous, with occasional thicker beds. Patches of gravel generally occur, scattered over the higher points, the pebbles being highly silicious, of many colors, often brilliant—white, yellow, red, green, black—and sometimes accompanied by fragments of silicified wood. These characters continued to the Little Colorado, which we forded at Sunset Crossing. The same formation was found upon the opposite side of the river, but more marked, and rising a few hundred feet in irregular bluffs, while beyond to the north-east, and forming a still better marked series of cliffs, were more massive sandstones—the same line of cliffs that occur at St. George, 225 miles to the north-west. At this point, and above, the river is not at all typical of this region, inasmuch as it does not flow in a cañon. On the contrary, its flood-plain is in many places a mile or more in width, through which it winds its muddy current in quite a tortuous course. It practically occupies a monoclinal valley between the carboniferous and the triassic. Proceeding up along the north bank of the river to where it is joined from the south by the river Puerco, the irregular triassic bluffs were upon the left, and we gradually rose through the strata composing them. As on the opposite side of the stream, these are mostly composed of dark-red and chocolate-colored shaly sandstones, with occasional cream-colored and thicker beds, the shaly sandstones being often ripple-marked, and all often highly gypsiferous, numerous small veins of gypsum ramifying through the mass. At the highest point reached, these beds were capped with a conglomerate of silicious pebbles—the 'Shin-ar-ump Triassic Conglomerate' of Powell." The "highly gypsiferous" character of certain strata indicate abundance of a most valuable fertilizer. The Colorado-Chiquito is dry every summer thirty miles below Sunset Crossing, but Chevelon's Fork, which falls into it a few miles above, has never run dry within the memory of the whites. The Colorado-Chiquito is here two to four feet deep, about eighteen feet wide, and abounds in otter, beaver, turtle and fish. Cedar grows within eighteen and pine within seventy-five miles, in a westerly direction. There is, however, an abundance of cottonwood along the river. In Chevelon's Fork, which here falls into the Little Colorado from the south, the water never fails; and in view of the wide extent of the Mogollon mesa or mountains, it is considered that artesian wells would be very successful on its upper portion, the altitude of which is 4,600 to 5,200 feet; the land is broken and irregular, but there are many flats suitable for farms. The Mormon settlements on both sides of the Colorado-Chiquito are five in number, aggregating at present about 400 people; the highest of which settlements appears to be Allen's Camp, thirty miles above Sunset Crossing. At Horse-Head Crossing, still further up, is another settlement, where there are two stores, but it does not appear to be Mormon. The Allen settlement receives frequent additions; they have raised this season (1877) forty acres of corn and over a thousand of wheat; they also have a patch of sugar cane, and evidently don't intend to throw money away buying sugar from the Sandwich Islands, or elsewhere, that they can raise at home. Frank Gray and others of these men recently went to Salt Lake City, and there obtained a threshing machine and a cane mill. The other settlements, or camps, are currently mentioned as Ballinger's, Smith's and Lake's. One of these pioneers thus describes, in a letter to the *Deseret* (Salt Lake) *News*, the result of their labor for the past year:

"We have built quite a number of houses, besides a large hall over fifty feet in length and about sixteen feet wide. We have a blacksmith shop, corrals, stock yard, and many other good and substantial improvements. Our land was all covered with a thick growth of rabbit and grease brush, and large, dry cottonwood logs that had fallen to the ground, intermixed with large quantities of drift wood from the river. We have cleared many acres of land, and sown and planted wheat, corn, squash, melons, sugar-cane, and a large variety of vegetables, all of which have done well, considering the chance they have had. We think we shall have about six hundred bushels of wheat, and about the same amount of corn. We have some of the largest squash I ever saw. Our melons are excellent; our cane is getting ripe, and we shall soon commence making molasses. Our wheat is all in the stack, and we are cutting and hauling our corn into the yard. Brother Ballinger's fort is a little more than one mile west of ours. They have had good crops of wheat, corn, and other varieties of vegetables. Brothers Jackson and Blinkey have been to the timber country, and made a molasses mill. Brothers Jackson and Garns have put the mill together, and it is now running night and day, grinding cane for Brother Ballinger, and making a first-rate article of molasses, clear as honey. Our grist mill has arrived, and we are going to commence building a foundation at Brother Ballinger's dam, close to the river, on which to erect a house for the machinery. So if all's well, we shall soon have a flour mill in active operation. Brother Hartley, an experienced lime-burner, with others to assist him, has been to Sunset Pass, and burned a kiln of lime for mortar for the mill foundation. So you see that we are progressing slowly but surely. By the help of the Lord we are going to make a success of this mission. We want now to be properly organized into the United Order, and then we are bound to prosper. We are trying to work in order. We should have one organization for all the camps or settlements. A military officer was at our camp yesterday. He was much surprised to see the great amount of work we had done in so short a time. We need some more good Latter-Day Saints to join us. We need a good shoemaker. Brother Ballinger needs a good blacksmith. Any and all other good faithful saints that are willing to live in the United Order. Those who do not want to live in that order had better not come out here."

The Grand cañon of the Little Colorado, 2,000 to 3,000 feet in depth, extends from the junction of the two Colorados, twenty-five to thirty miles up the river. An Indian trail leads out of it on the north side, seventeen miles above the junction. Near its upper terminus are four Indian villages, adjacent to a large pine forest. Between this point and Sunset Crossing no settlements are at present known to exist. The main road from Prescott to Fort Wingate crosses the Colorado-Chiquito, near Cañon Diablo, (or Devil's Cañon) represented on page 298.

The habitations of the Moqui Indians, to the east of the Little Colorado river, and a little south of the thirty-sixth parallel, are on the summit of lofty sandstone mesas, "surrounded by a wide, barren, sandy region, where grass is found but sparingly and in small patches," but plentiful when the rain is more than average. There is no water for irrigation, and only a few small springs for household purposes. The sand is of light reddish color, loose, and does not require plowing; they do not know the use of manure. It is no longer a secret how the Indian corn is raised, (on which they mainly depend for support) when it is known that the soil contains a sufficient amount of moisture to develop the seed, and that there is, as shown by chemical investigation, a slow and steady replacing of the loss of water by evaporation, proving the presence of a stratum of water at moderate depth, ascending by capillary attraction to the seed planted at a depth of from one foot to eighteen inches. Under these unfavorable circumstances, with no wells or labor-saving machinery of any kind, those poor and industrious people have supported themselves for centuries, only until recently taking up any better



DEVIL'S CANON.

land. If in so inferior a part of the Territory a race of people usually regarded as industrially inferior to our own support themselves, is it not reasonable to suppose that industrious and intelligent white men, with the customary facilities, can make for themselves in much better locations, previously described, pleasant and profitable homes?

General Kautz, commanding the Department, while recently passing through a large portion of the Navajo reservation, saw numbers of Indians with immense flocks of sheep and goats and herds of horses. He went up the Cañon de Chelly to see the remarkable scenery, and found the cañon populated with Indians, having large cornfields and peach orchards, and flocks of sheep and goats, and herds of horses. In fact, everywhere that he met Indians they seemed to be industrious and thrifty. The Puerco was also quite populous with these thrifty Indians. He found the Moquis also well to do, with fine looking crops of corn and herds of sheep. Removed to a more favorable country, with their present industry and economy, they would soon become rich; but under present circumstances they have a hard struggle for existence. The great difficulty throughout the whole northern portion of the Territory is the great scarcity of water. There is no living stream north of the Little Colorado; even that stream was dry where he crossed it, and for fifteen miles along its course that he travelled above the Cascades before he left it for the San Francisco mountains. He saw a number of fine springs, which, however, were all in use by the Navajoes. In the San Francisco mountain country he saw and heard of many large bands of sheep and cattle. Notwithstanding the dryness of the season, the grass is very fine in that region, particularly on the eastern side of the mountain. On the Little Colorado he found a well traveled wagon road, evidently made by the Mormons. The party supplied themselves with all the turkey and antelope they required in passing along the wagon road, without stopping to hunt. The San Francisco mountain region is well timbered, having an average altitude of 7,000 feet, but the highest peaks are estimated to be 13,000 feet above sea level and covered with snow for ten months in the year. The predominant rock is basalt; but the strata of underlying carboniferous limestone are here and there exposed. This country is described by Beale as "the most beautiful region I ever remember to have seen in any part of the world. A vast forest of gigantic pines, intersected frequently by extensive open glades, sprinkled all over with mountain meadows, and wide savannahs, filled with the richest grasses, was traversed by our party for many successive days." And Dr. Parry says: "We have in these elevated districts a climate favoring a growth of trees, a more equable distribution of rain and dew throughout the year, especially adapted to the production of nutritious grasses, and the cultivation of grain without resorting to the expensive processes of irrigation. These desirable climatic features are especially noticeable along the elevated slopes of the San Francisco mountains, where magnificent pine slopes are agreeably interspersed with beautiful grassy valleys and parks, numerous springs, and a delightfully invigorating atmosphere. The most attractive place of summer resort on the line of the road is at Mount Agassiz. It has every attraction; health, scenery, sky, water, elevation, climate, and proximity to the greatest natural curiosity known on this continent—the Grand cañon of the Colorado river, from which it is distant some 40 or 50 miles."

On the way from Dog Buttes *via* Cosnino Caves, on Flat-top mountain, (which is on the eastern side of the range) an exploring expedition "crossed a number of little valleys and open glades, splendidly suited for farming purposes, here and there encountering springs and fine grass." They found the soil at one place where analyzed, "very rich in phosphoric acid, and therefore most excellent for grain and corn"; but for peas, beans, and lentils, gypsum, (procurable in abundance at Sunset Gap mesa, thirty miles east) was considered a desirable addition. The Cosnino Caves before mentioned are fourteen in number and situated about twenty miles east of Humphrey's Peak, the highest point on the San Francisco mountains, on a steep slope, their walls formed by flows of basaltic lava. They are partly side-by-side and partly above each other, and were formerly dwelling-places of Cosnino Indians.

We now reach the south-eastern part of Yavapai county, in the vicinity of Prescott. In the valley of the Verde settlements have recently been made to a considerable extent; there are several nice farms and dwellings and an irrigating canal six miles in length; a flour mill is in contemplation. Cienaga is a mail station and hotel, thirty-two miles east of Prescott and ten miles west of Camp Verde, on the Prescott and Santa Fé road. Three miles west of it some mines are being worked with arrastras by W. W. Compton & Co., and four miles north are the Cherry Creek mines. The principal business, however, in the vicinity is raising sheep and cattle. Williamson's valley, to the north of the Black Hills, is well adapted to both stock-raising and ordinary farming; several families are settled there, and fifty children attend school.

J. Ross Browne describes the bold, elevated, and picturesque Sierra Prieta, or granite range, running nearly north and south to the east of Prescott, as a ridge terminated on the north by granite mountains, which "to the east presents a very ragged front, deeply scored by ravines and ribbed by ragged, precipitous spurs, * * * ending northward in barren rock cones of 700 or 800 feet in height, and on the south extending into the summit ridge of the chain," the average elevation of which is nearly 8,000 feet, rising at Granite mountain at the north, Mt. Union at the middle, and Bradshaw mountain on the south, to 9,000 feet. The range extends from Granite mountain southward sixty-five miles, lateral extension averaging twenty-five miles; long, rocky spurs descend at easy grades to the plains on either side. The soil of the mountain valleys of this chain is often rich in elements of fertility; but from the great elevation and great nocturnal radiation in the clear summer months, it is found that few crops can bear the rigorous climate, frost occurring in every month of the year. It snows heavily in the mountain in winter, and rains in July and August. The streams which rise among the volcanic group on the Colorado mesa join those from the Aztec range, and have excavated out of the mesa formations broad valleys, whose general elevation is 5,000 to 5,600 feet above the sea. Of these the largest embraces Williamson's and other valleys, containing not less than 500,000 acres, besides about 300,000 acres of thinly-wooded foot-hills adjacent, also well supplied with bunch grasses. Skull valley is divided into two by a cross ridge of granite; the northern part is poor soil. South of the ridge are farming settlements, founded on a deep, black mould of great fertility; the climate never very cold nor ever intensely hot. From Truxton springs to Prescott by the northern route are a series of terraced plateaux, each one to the east growing in height, and being gained by following up an easy grade through cañons leading to their summits; these different table lands have all the appearance of being regular mountain ranges when seen from the west; the slopes in many cases are covered with timber. Close around Prescott the stage road coming from the south follows up what is designated by Lieutenant Wheeler, in his admirable reports and maps, as the "Weaver mountains," but which are here called the Antelope range. There is a peak of that name; hence the common title.

A. K. Marvine, in Wheeler's report, thus describes another portion of south-eastern Yavapai: "Upon leaving Aztec pass, some fifty miles north-west of Prescott, the edge of the Juniper mountains recedes upon the left to join the main mesa on the north, the road entering upon the large area of plutonic and metamorphic rocks which surround Prescott. This is in part a rolling country, and in part surrounded by abrupt hills and mountains, mostly sprinkled with junipers, and often fine large pines, with their accompanying characteristic vegetation and frequent open valleys, all forming a most delightful region, which is apparently under successful cultivation." Walnut Grove, on the Hassayampa, about thirty miles south of Prescott, is one of the best farming districts in central Arizona. From the Weaver district fresh vegetables are taken to Prescott; a turnip grown there weighed six pounds.

Mount Hope is in Yavapai county, some ten miles or more east of the Mojave county line, and six miles south of the road from Mineral Park to Prescott, near old Camp Hualapai. Six miles south of it Sherman's saw-mill averages 5,000 feet of lumber daily. The forest of pine is in a beautiful valley to the east of Mount Hope, at the nearest point a half-mile distant, and extends for six miles in a nearly north and south course. The whole amount of good sawing timber is estimated to be from twelve to fifteen million feet. Water is abundant, and is found in many places in the valley from five to fifteen feet below the surface. Three claims of 160 acres each have been taken up in the heart of the timber. To the north of the mill is a claim, mostly timber, with a small valley of some forty acres of good farming land. For a large area in the vicinity of Mount Hope are very good grazing lands. Scores of small but rich and beautiful valleys of from 40 to 400 acres of good farming lands are scattered all through the mountains. The lumber of this region is of great value to southern Mojave county, and needs roads to shorten circuits.

In the vicinity of Bill Williams and San Francisco mountains, at the Little Colorado, on all the mountains north of Prescott, at Bear springs, Date creek, Willow creek, Williamson's valley, at the Black mesa, the Big Sandy, the lower Agua Fria, and the Verde, as well as in many other localities in south-eastern Yavapai, sheep raising is extensively and profitably followed. It has been proved that even in such an unusually dry year as the present has been, sheep can be in Arizona kept fat all the year round. The summer rains usually come in time to give its abundance and variety of rich grasses the requisite stimulus to bring them up from the root—not, as in southern California, from the seed. Wool-growing will hereafter increase in profit by the decline in freight consequent on railroad extension, as well as by the establishment of woolen factories, sites for which are numerous in the country around Prescott, where there is also a good demand for the product, and a public-spirited population to give welcome and practical encouragement to such as may make the first venture.

Mojave county, off the Colorado river, is not regarded as available to any considerable degree for agricultural purposes. The Sacramento valley, west of the Cerbat range, and the Hualapais valley on the east of it, may prove to be good farming and pastoral regions, but are defective in running streams. There may be also some good land on the eastern slope of the Peacock mountains; and any farming products raised in or near those portions of Mojave county on which mining is carried on could command prices that in a farming country would seem extravagant. In the Hualapais mining district grain was recently brought from California, and cost eight to ten cents per pound, and hay twenty dollars per ton. There is here a good grazing country, but not much stock; the game consists of mountain sheep, antelope, deer, quail and rabbit.

With the subject of agriculture, that of land tenures is naturally associated. In the entire section of country acquired from Mexico by the United States, the subject of titles to private land claims has been one of great importance. In California and New Mexico, settlers have been forced from their homes after years of residence and improvement; and as alleged private land claims are found in many portions of Arizona south of the Gila river, a brief statement of the present condition of such grants will prove of interest. The only portion of the Territory in which said grants are alleged to exist, is in that portion acquired under the Gadsden purchase of December 30, 1853, and therefore must be governed by different regulations than those which govern similar grants in California and New Mexico. Section 5 of the Gadsden Treaty re-enacts the provisions of the Treaty of Guadalupe Hidalgo, with reference to land titles, viz: those provisions which make titles that were held good by the Mexican authorities at the time of the treaty valid in the United States; while in the following section, No. 6, it is further enacted that no such titles will be considered valid unless recorded in the archives of Mexico. In answer to a Senate resolution of February 3, 1873, President Grant forwarded on December 8, 1874, to the Senate a report of the Secretary of State, with accompanying papers, relative to records of land grants located in Arizona and New Mexico, found in the archives of Mexico. In this report it is shown from the careful examinations made in the cities of Mexico and Guadalajara, by R. C. Hopkins, acting under instructions from the Secretary of State, that there is in existence in the archives of Mexico not a single record of a land grant in Arizona or New Mexico. When, therefore, we recall the section of the Gadsden Treaty making such records essential to a valid title, it becomes apparent that probably no grant of land in Arizona derived from Spain or Mexico will be found good. Again, by a Mexican decree, dated November 25, 1853, over a month previous to the signing of the Gadsden Treaty, it is declared "that the unoccupied lands, being the exclusive property of the nation, never could be alienated under any title, either by power, orders or decrees of legislatures, governments or authorities of the States or Territories of the Republic"; and "therefore all sales, transfers and all other acts of transferring property of said unoccupied lands, without the express sanction and order of the Federal authorities, as prescribed by law, are null and void."

This was the law of the province now included within the limits of southern Arizona, and is the one which under the decision of the Supreme Court of the United States making the law of the province the law upon which the validity of Mexican or Spanish grants must rest, will be taken into consideration in investigations of the validity of titles to grants in Arizona. This law, or decree, was of undoubted integrity in Mexico; for it is referred to in a law of July 7, 1854, requiring all land proprietors to forward their titles to the Supreme Government for revision and record, and is repealed by an act of December 3, 1855, nearly two years after the signing of the Gadsden Treaty. Now all the Mexican grants in Arizona are known as Treasury-General grants, having been made by the Treasurer-General of what then comprised the State of Occidente, (now Sonora and Sinaloa); and as will be seen by the above remarks, at the time of the treaty all such grants were held null and void. Any law of Mexico enacted after the treaty was proclaimed or signed, of course, could not affect property that had passed under the jurisdiction of the United States. The United States Surveyor-General of Arizona is authorized by law to investigate the titles to private land claims derived from Spain or Mexico within his district; but as all grants must, to be confirmed, be in strict conformity to all laws on the subject, it is quite evident what the decision will most likely be. Moreover, it was the custom of both Spain and Mexico to hold all mineral land the exclusive property of the central government, and titles to such land never passed by gift. Therefore, even admitting that valid grants do exist in Arizona, they could not influence ownership of mining claims.

For agricultural purposes, and with especial reference to irrigation, Arizona, as well as New Mexico, southern California, and other localities similarly situated in regard to water supply, may be divided into, (1) valleys which can be irrigated by the streams flowing through them; (2) mesas, or table lands, and mountains; and (3) mountains. Individuals, or small associations of cultivators, can manage to irrigate the valleys; the mesas require more extensive, and consequently expensive operations, involving the construction of canals sometimes forty or fifty miles in length, though there are none over eight or ten as yet in Arizona. Artesian wells are the best where they can be had, but often prove very expensive; and undertaken (as they often are) with inadequate practical or scientific knowledge, sometimes prove entire failures. The principle on which they depend is thus explained in one of Wheeler's reports: "The well, and the stream which supplies it, are always equivalent to a bent tube, or inverted siphon, filled with water in the longer leg to a height greater than the top of the shorter. The well is the shorter leg; the natural conduit, tapped by the well, the longer. The natural conditions upon which the possibility of an artesian supply depends are: firstly, that of a series of inclined strata, one, so porous as to permit the circulation of water, shall be contained between others comparatively or absolutely impervious; secondly, that these strata shall sometimes rise to a height greater than that of the point at which the discharge is sought; and thirdly, that the free discharge of the subterranean water shall be checked in other directions. It is not essential that the reservoir shall be completely closed at all sides lower than the position of the well, but merely that the flow of water shall be so far impeded in such directions that the pressure from the head may suffice to raise it to the desired altitude." Valleys surrounded by mountains at short distances, as are generally the valleys in Arizona, are therefore very likely to contain artesian water at no great depth; and in order to determine this question on definite data, the Territorial Legislature offers a gratuity of $3,000 for the first well of three hundred feet, and $5,000 for the first well of five hundred feet in depth. At the prices charged by contract in San Bernardino, the well at three hundred feet would not cost over $300 for the actual boring, exclusive of piping, etc., the extent of which would depend much on the character of the rock traversed. Of late, machines have been invented that it is claimed will bore over a hundred feet daily, or test to a depth of several hundred feet in even less time, in any kind of ground. But those unable to incur the expense or risk of an artesian well, would find it profitable to sink surface wells, and pump the water by windmills, for such fruit and vegetables as can be sold at good prices; as is done near Sacramento with profit, though at low prices for the product. And in most parts of Arizona so little irrigation is necessary, on account of the *two* rainy seasons, that a very small amount of irrigation can be made to go a very long way. Hon. R. C. McCormick, formerly delegate from the Territory, Col. H. C. Hodge, and others, strenuously advocate that the general government should itself develop artesian wells at suitable points in the Territory, and thus, as Col. Hodge writes in "Arizona as It Is," bring into market "large quantities of rich land, under successful cultivation, as can be found on the continent. * * * * * Many millions of acres of land, now almost worthless and unproductive, would become centers of rich and extensive farming districts. * * * * * Government would be repaid a hundred fold by sales of land, and by a wonderful increase in taxable property for the support of government."

Nearly every portion of the Territory available for agriculture or stock raising, has been described. Commencing at its main portal at Yuma depot, thence ascending the Colorado—a second Nile—we find at intervals on both sides of the river, areas of land available not only for grains, but for semi-tropical and even tropical fruits; areas large in themselves, but small in comparison with what might be made available by extensive irrigation works, for the support of a large population. Then we ascend the Gila and its branches, the main stream running a course of 400 miles or more through the Territory, from east to west, with water enough in its channel to irrigate 800,000 acres on its banks and on those of its tributaries, where ages ago a dense population supported themselves in comfort. The Santa Cruz and lateral valleys are good for a hundred thousand acres more; and still we have not a tithe of the total land resources of the Territory. Next were described a few of its hundreds of isolated valleys and mountain slopes, some already fruitful by nature; others capable of becoming so at far less outlay than has been expended on inferior lands elsewhere on the Pacific slope. From these mountains issue numberless small streams naturally soon lost in the dry plains, there depositing the materials for artesian wells, but which might also be utilized at trifling cost before sinking into the ground. Then were noted rapid alternations of mountain and valley and fertile plain, characteristic of the border of New Mexico; we followed the Colorado-Chiquito down to the new homes of the industrious and successful Mormons at Sunset Crossing; thence to the elevated plains, snow-clad mountains and dense forests of south-western Yavapai; lastly, returning to the vicinity of the Colorado, in Mojave county, which it would be premature to consider as unproductive agriculturally, in view of past misconceptions as to other portions of the Territory, which facts have already removed. Everywhere we find resources rarely paralleled for either successful cultivation or profitable pastoral enterprise, needing only moderate investments of labor and capital to make productive. Probably nowhere in the world can be found combined to the same extent the natural facilities for production from the soil, and the market which alone can render that fertility available for civilized uses. This market is already furnished by rapidly extending mining enterprises, certain of a ten-fold increase as the richness of the country in metals becomes better known, and further railroad facilities make it more accessible.

CHAPTER XII.

MILITARY POSTS AND TELEGRAPH.

ORGANIZATION OF THE DEPARTMENT. ITS COMMANDER AND FORCE. THE VARIOUS POSTS AND THEIR SURROUNDINGS. APACHE. BOWIE. LOWELL. HUACHUCA. MCDOWELL. MOJAVE. THOMAS. VERDE. YUMA. THE MILITARY TELEGRAPH. LIEUTENANT READE. ITS BENEFICIAL RESULTS.

The first military occupation of what is now the Territory of Arizona by the United States was when, in 1847, soon after the treaty of Guadalupe Hidalgo, (Feb. 2d, 1848) Fort Yuma was occupied; and in pursuance of the Gadsden purchase of December, 1853, by which that portion of Arizona south of the Gila was acquired, the Mexican troops and authorities left Tucson on March 10th, 1856, soon after which United States troops were stationed south of the Gila. But it was not until 1853 that Arizona north of the Gila and off the Colorado river was occupied to any extent by American soldiers or civilians. On December 23rd, of that year, Fort Whipple was located at Postal's ranch, 24 miles north-east of Prescott; and on May 18th, 1854, was removed to the left bank of Granite creek, one mile north-east of that town, where it became the headquarters of the district, subsequently the Department of Arizona. The limits of the Department as defined by general order 41, Adjutant-General's office, April 15th, 1870, are the Territory of Arizona and so much of the State of California as lies south of a line from the north-west corner of Arizona Territory to Point Conception, California. The present commander of the Department is Col. August V. Kautz, eighth infantry, Brevet Major-General United States army. There are now stationed in the Department of Arizona the sixth regiment of cavalry, the eighth regiment of infantry, and a few companies of Indian scouts.

Camp Apache is on a fork of the White mountain river, in lat. 33 deg. 40 min., long. 32 deg. 52 min., altitude nearly 6,000 feet above the sea. It was first occupied in May, 1870, and made a permanent post under the successive names of Camp

Ord, Camp Mogollon, and Camp Thomas, in 1872. It is situated in a valley several miles broad and 1,200 feet deep, excavated in carboniferous sandstone and limestone by that river since the flow of the basalt which caps the adjacent uplands. A second lava stream and a third flowing down the new valley have been in turn cut through by the creek, the channel of which is now but fifty to seventy-five feet below the last lava surface. The White mountains, or Sierra Blanca, on the southwest slope of which the post is situated, consist of a cluster of rounded summits, from ten to twelve thousand feet in height, which constitute the most elevated range of eastern Arizona, their tops being covered with snow during a great portion of the year. To the eastward they extend into New Mexico and connect with other chains; on the Arizona side they are prolonged into the lower range of the Mogollon. These ranges and the cliffs of the Black mesa form the divide between the tributaries of the Colorado-Chiquito and those of the Gila, the principal of which, the Salt river and its tributaries, rise in the Sierra Blanca. These rivers have cut profound cañons in the flanks of the mountains, and have hollowed out extensive valleys, in one of which Camp Apache is situated, in full view of the main summits of the Sierra Blanca, which in summer loom high up to the eastward as dark masses, and in winter as snowy crests. The mountain ranges described under the names of Sierra Blanca, Mogollon, and Black Mesa, present one and the same geological character. They consist of the original sedimentary beds, fractured and uplifted by the action of subterranean forces and of extensive outflows of lava, which, issuing from various outlets, once overspread the country, covering it with a sheet of molten matter, the remains of which are now seen in the shape of more or less isolated basaltic tables, connected with extinct volcanic craters and cones. Strata are found of more or less compact grayish sandstone, sometimes containing fossils. This stone is used at the post for building purposes, and though soft when quarried, hardens rapidly on exposure to the air. A soft, laminated sandstone of a drab color is also found, and seams of gypsum are observed in various places between the clays. Half-way between the post and the summit of the Mogollon, organic remains show the beds to be of the lower jurassic period.

The winters at Camp Apache are severe, snow-storms being frequent from December to April, when spring opens warm and dry; vegetation not starting much, however, until the rainy season, which is from the latter part of June to September. During that period, few days pass without heavy showers and thunder storms, which temper otherwise unendurable heat. With the cessation of the rains, hot weather returns for a few weeks, and the autumn months are marked by disagreeably warm days, alternating with cold and chilly nights; even during the hotter part of the year, the nights are wonderfully cool and pleasant; the annual range of temperature is from 3 deg. to 104 deg.; monthly range in summer, 103 deg., other seasons, 55 deg. Corresponding with the climate, the vegetation partakes of a northern and alpine type. The soil of the river-bottoms is very fertile; cereals, especially corn, growing to perfection with a very moderate amount of labor. The success of the post gardens has equalled the most sanguine expectations. Panthers, wild-cats and cinnamon bears haunt the pine forests of the mountains; coyotes are abundant; gray wolves and foxes are often seen; deer are occasionally shot; few birds are permanent residents; the wild turkey is abundant, mountain quails less so, and a few ducks and snipes frequent the streams, which—in the mountains—contain many species of fish, including speckled trout; reptiles and venomous insects are scarce. The post is 230 miles from Tucson, and equally distant from Prescott; the roads, except to New Mexico, are little better than trails. There are stationed at the posts, under command of Capt. J. N. Andrews, eighth infantry, companies E and C of that regiment, companies D and E, sixth cavalry, and company A, Indian scouts; a total of 8 officers, 205 enlisted men and 40 scouts.

Camp Bowie is in Apache Pass, Chiricahua mountains, and was established in 1862, as a protection to the stage road and adjacent springs; it is in latitude 32 deg. and 40 min.; longitude 109 deg. 25 min. and 30 sec.; altitude 4,862 feet; fifty-five miles from the nearest town—Ralston, New Mexico;—105 miles east of Tucson, and fifty-six miles from Camp Grant, the nearest military post. The post garden yields a fair supply of vegetables, and enough grama grass grows in the neighborhood to afford full pasturage for stock; the ground is of limestone formation; piñons and Emory's oak, neither over twenty feet in height, are the prevailing timber on the hills just higher than the post. The acorns of this oak command a good price at Tucson; they are eaten either roasted or raw. The wild cherry (probably *prunus demissa*) is found in the neighborhood of Camp Bowie, but is larger a few miles further south. The fruit is far superior to any wild cherries elsewhere known, and equal to the ordinary cherry of cultivation; but the Indians and

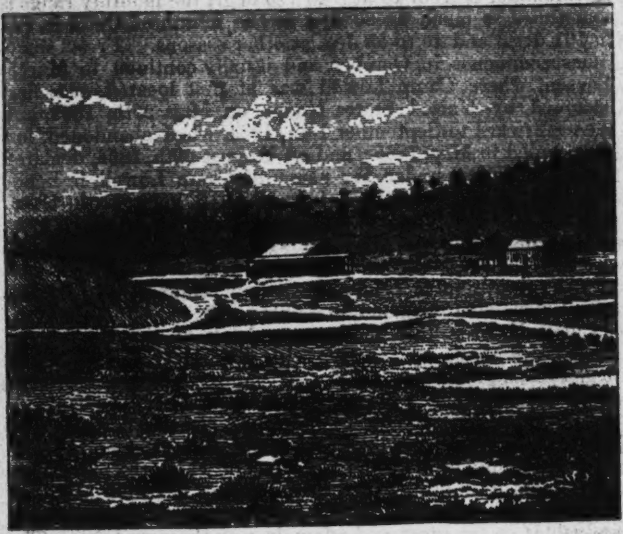
Mexicans will not use it. The post is remarkably healthy; it is commanded by Capt. W. Wallace, sixth cavalry, companies H and I of which are there stationed, numbering 3 officers and 104 men.

Camp Grant was originally located at the confluence of the Nevaissa and San Pedro rivers in 1856, being then designated Fort Breckenridge. The situation being extremely malarious and unhealthy, it was abandoned, and the new post established in January, 1873, on a plain fifteen miles in width and over one hundred miles in length, in latitude 32 deg. and 25 min., longitude 32 deg. 23 min. and 10 sec. Tucson is 116 miles south-west; Camp Bowie fifty to sixty miles south-east, and the San Carlos Indian Agency eighty miles. The post is about two miles from the summit of Mount Graham, which is 10,375 feet above the sea; Camp Grant being 3,985 feet, on a sort of mesa, sloping south-westwardly towards the plain—a region unattractive in appearance, but abounding in good wood, grass and water. Dos Cabezas, the highest peak in the southern portion of the Territory, is visible from the post. The mountain is composed of gneiss and syenitic rocks, the mass being metamorphic; its slopes are very steep. Mesquite is most conspicuous and abundant from the base of the mountain to a certain altitude, and sparse on the mesa. White and yellow pines and firs grow on the mountain tops in unlimited quantities, and to a considerable height, with trunks sometimes five feet in diameter. The juniper tree, the berries of which are used as food by the Indians, also grows on the mountains; and sparingly along the margins of the streams grow the cottonwood, oak, sycamore and willow. The sacaton and three varieties of grama grass cover the plain, where there are springs, and water at ten feet deep. The soil is generally good. The country abounds in game, such as deer, antelope, wolf, wild turkey, duck and quail. Manzanita is abundant between the oak and pine belts, and bunch grass at altitudes of 7,000 to 9,000 feet among the timber. In the moist valleys leading from the main peak, rushes and ledges make thousands of acres of excellent forage, on which stock get fat, strange as it may seem. The water is excellent for all purposes on the adjacent mountains, whose streams are soon lost in the plain, but reappear some miles below. The phenomenon of the mirage can here be seen as perfectly as on the Sahara. The warm season is protracted. The winters are in general mild, but subject to violent winds and heavy rains, alternating with very pleasant weather. The annual rainfall is over twenty inches, occurring generally in July and August and in some of the winter months, though there are very few months in which the rain is wholly absent. The post is commanded by Major C. E. Compton, sixth cavalry, of which regiment it is the headquarters. The band and companies C, G and M, of the regiment, and company I, eighth infantry, are there stationed, numbering 13 officers and 209 enlisted men. Camp Huachuca is a temporary post on the mountain range of that name, near the Mexican line, about forty miles east and south of the Santa Rita mountains, and is designed to protect the important mining interests therein.

Camp Lowell is seven miles east of Tucson, in latitude 42 degrees, 12 minutes; longitude, 110 degrees, 52 minutes; altitude, 2,530 feet; on the Rillito river, on a plain or mesa which is a part of the vast extent of rolling ground stretching from the Rio Grande into southern California, interrupted at irregular intervals by abrupt and very irregular sierras, and by water courses in general dry during most of the year. Apparently regular and symmetrical as are the Santa Catarinas, Santa Ritas and other mountains near to or visible from the post, they abound in deep clefts, uninviting passages, and long, tortuous, precipitous cañons. At the camp, the alluvial deposit is about two feet in depth, resting on a calcareous, sedimentary deposit two to five feet in thickness, underneath which is a layer of gravelly earth about fifteen feet thick, and below that a stratum of clay from one to two feet thick, then a bed of gravel of unknown thickness is reached, in which, at a depth of from five to ten feet, living water is obtained. Cottonwood, alder and sycamore grew on the banks of the streams; there are forests of white pine on the mountains; the white ash and the white oak grow on the foot-hills. There are two varieties of the mesquite, which are small and stunted on the mesa, but quite large in the valley of the Rillito, and on a part of that of Santa Cruz. On the plains in the vicinity of Camp Lowell the cactus is often the only plant of vegetation, sometimes varied by the equally desolate grease wood and sap brush. Cereals and vegetables, especially tomatoes, are raised with great success. Irish potatoes fail on account of the richness of the soil, and cabbages on account of insects. Irrigation is indispensable. Black and cinnamon bears, black and white-tailed deer, antelopes, yellow foxes, raccoons, and cotton-tailed rabbits, are all found within thirty miles of the post. Among the birds in the neighborhood are the wild turkey, sand-hill crane, duck, curlew, snipe, wood-cock, mountain quail, pigeon, meadow lark and wild goose. There are several warm springs on the mesa toward the east. The well water is very hard. The annual rain-fall varies from eight to seventeen inches. The annual range of the thermometer is from 18 deg. to 116 deg.; the monthly range is sometimes as much as 80 deg. in the month of October, (21 to 101 deg.) and 40 to 55 deg. at other seasons. Frosts sometimes commence in October, and usually continue to March. Tucson, where Camp Lowell was at first located, was first occupied by United States troops on May 20th, 1862, and thenceforward to September 15th, 1864, when abandoned, but re-occupied in May, 1865; and on August 29th, 1866, declared a permanent post under the name of Camp Lowell, in honor of Brigadier-General C. R. Lowell, U. S. vols., sixth U. S. cavalry, killed at Cedar Creek, Virginia; and on March 19th, 1873, removed to its present location. Capt. N. S. Worth, eighth infantry, is in command of companies B, sixth cavalry, K, eighth infantry, and D, Indian scouts—being 6 officers; 102 enlisted men, and 40 scouts.

Camp McDowell is on the west bank of the Rio Verde, eight miles above its junction with Salt river, in latitude 33 deg. 40 min., longitude 34 deg. 37 min., 1,800 feet above sea level. Cottonwood, willow and alder grow along the banks of the river, intermixed with grape vines yielding a small acid fruit. Mesquite, iron-wood, polo verde, artemisia, and species of *opuntia* and *cereus* cover the mesa, of which the more open parts furnish indifferent grazing. Scrub oak, live oak, and large pine are found on the Mazatsal range. There are quail and rabbit on the mesa, and a few deer on the mountains. The post garden furnishes a liberal supply of vegetables, raised by irrigation; the climate is warm and dry, but very extreme, ranging from 18 to 24 deg. in winter and 108 to 140 deg. in summer. Snow falls on the Mazatsal, but not on the mesa. The annual rain-fall varies from five to twenty inches. The fish of the Rio Verde are abundant, but soft and flavorless. The post was established by five companies of California volunteers in 1865. It is now commanded by Captain A. W. Corliss, eighth infantry, and is occupied by company C of that regiment and company I, sixth cavalry, numbering 5 officers and 87 enlisted men.

Camp Mojave is in latitude 35 deg. 0 min. and 24 sec., longitude 114 deg. 34 min. and 40 sec., altitude 600 feet above the sea and 60 feet above the Colorado river. The Mojave and other Indians had, in the summer of 1857, committed depredations on emigrants. The site was selected by Lieutenant Whipple, who is said to have been the first American to publish details of the customs and language of the Mojaves. The post was established in 1858, abandoned in May, 1861, and re-garrisoned in May, 1863 by two companies of the fourth California volunteers. The reservation (area 5,572 acres) was declared on March 30th, 1870, and published in general order 19, headquarters Military Division of the Pacific, 1870. The terrace on which the post is built consists of water-worn boulders washed down from the barren mountain ranges on each side of the river, testifying to the activity of the river in former ages, when it was much above the present level. Water is obtained from the river, filtered through gravel into a well, pumped into tanks and conducted by pipes to the quarters. Wood and hay are obtained from the Colorado valley below the post. Mullet are found on the river, but are usually of no value, being soft. Ducks, geese and quail are numerous in the fall; deer, mountain sheep and antelope are found in the hills. There is no

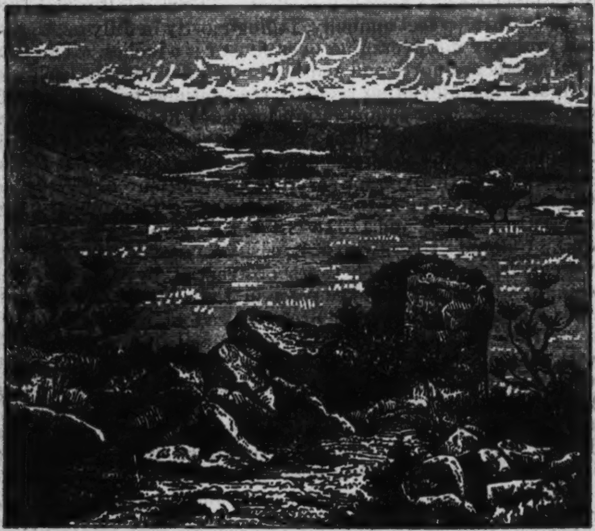


CAMP M'DOWELL.

post garden. The bottom land, six miles south of the post and on the reservation, is partly subject to overflow, fertile and covered with coarse grass, cottonwood and mesquite trees, with a dense undergrowth of willows and arrowweed. On the elevated plains, broken by dry arroyos, is a spare growth of greasewood interspersed with cactus. The mountains are barren, timberless and almost waterless. The rain-fall varies from three to thirteen feet annually, falling mostly in July or August, and probably not averaging over five or six inches. The principal winds are north and south, blowing five months each way with almost undeviating regularity, sometimes bringing terrific sand storms. The summers are intensely hot, even the nights bringing little or no relief; malarial diseases are prevalent in summer and fall, the effects of which are seriously felt by the troops kept at the post for several years, and are especially developed upon removal to a colder climate. The annual variation is 21 to 29 deg. and 113 to 118 deg. Its supplies are received by the Colorado river, which is easily navigable from April to November, but at other times obstructed by drifting sand bars. The annual rise takes place in June. This post is seven miles below Hardyville, the present head of navigation, forty miles from Cerbat, 165 from Prescott, and 150 miles by trail from Ehrenberg; is commanded by Captain E. C. Woodruff, twelfth United States infantry, and occupied by company A of that regiment, consisting of 3 officers and 27 men.

At Camp Thomas, on the Gila river, companies F, sixth cavalry, D, eighth infantry, and C, Indian scouts, are stationed, under command of 1st Lieutenant J. N. Powell, sixth infantry, numbering 4 officers, 83 enlisted men, and 40 scouts. Cottonwood is abundant, and water is obtained both from the river and from springs. There is a village and settlement in the immediate vicinity.

Camp Verde is in latitude 34 deg. 33 min., longitude 34 deg. 57 min., at an elevation of 3,500 feet above the sea, and eighty feet above the Rio Verde, distant about a mile from its western bank; forty-seven miles east of Prescott, and ninety miles, by a rough trail, north of Camp McDowell. The valley of the Verde, though generally very narrow, is here about seven miles in width, with a rich, alluvial bottom and a luxuriant growth of cottonwood, willow, and alder. With irrigation, good crops of corn, barley, and vegetables are produced; and the company gardens, about a mile and a half above the post, furnish an excellent, varied, and abundant supply of vegetables. Pine timber is obtained from the Black mountains, which rise 3,000 feet above the river. Deer, antelope, and wild turkeys abound. The annual rainfall varies from six to fourteen inches. The climate ranges from five to one hundred and thirteen degrees, with frosts as early as October. Companies A sixth cavalry, A and D eighth infantry, and B Indian scouts, are here stationed, under command of Captain C. Porter, eighth infantry; a total of 6 officers, 117 enlisted men, and 40 Indian scouts. The post was established under the name of Camp Lincoln, by Arizona volunteers, in 1861, as an outpost of Fort Whipple. It was first occupied by regular troops in 1866. Its location was, in 1871, on account of malaria, removed south about one mile, and it is now about half a mile south of the confluence of Beaver creek with the Verde.



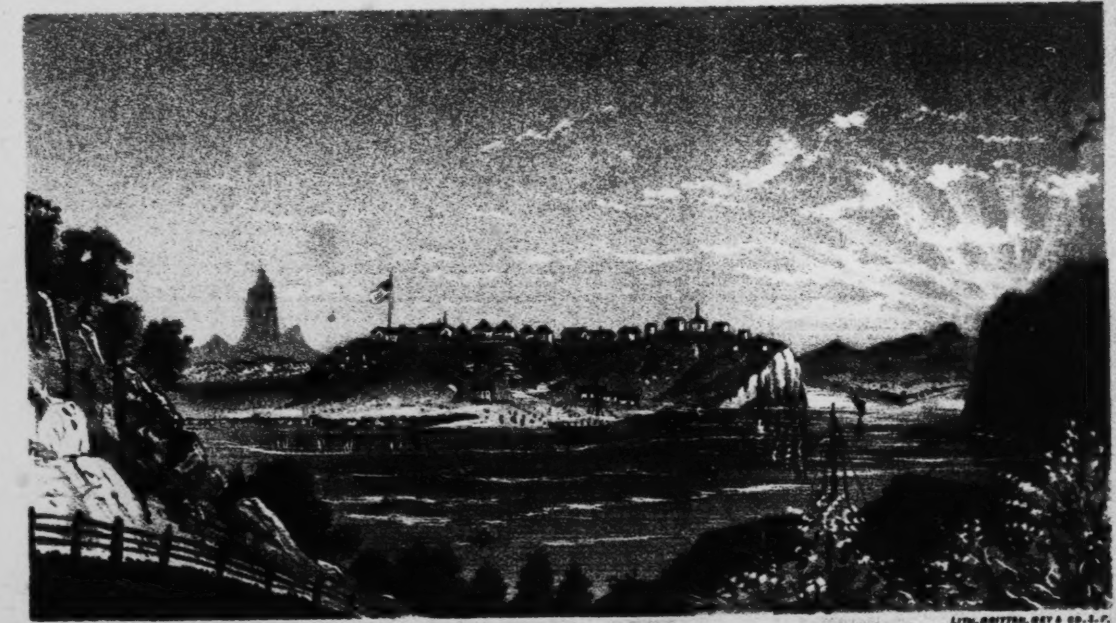
VALLEY OF THE VERDE.

Fort Whipple, the headquarters of the Department of Arizona, was located at the time and under the circumstances stated at the commencement of this chapter, in latitude 34 deg. 29 min. 6 sec., and longitude 35 deg. 27 min. 30 sec. Its climate is mild in the spring and summer months; during the winter the mountains are covered with snow, which sometimes lies a week or two in the valleys. Only in July does the thermometer occasionally reach to ninety degrees; but in the winter it sometimes goes down to ten degrees, and occasionally reaches even zero. At the post garden potatoes, cabbages, turnips, corn, beets, tomatoes, melons, and cucumbers are successfully cultivated, without irrigation; timber is very abundant in mountain, plain, and valley; and no more healthy and pleasant location can be found. There are stationed at the post companies K sixth cavalry, and F eighth infantry, under command of Lieutenant-Colonel J. D. Wilkins, eighth infantry; numbering 8 officers and 85 enlisted men.

The former post buildings, or their ruins, lie to the west of the present ones. This region was infested when it was established by Apaches of a hostile character, and the post buildings and corral were inclosed by a heavy adobe wall. Sentinels keep constant watch from the flat roofs, and it is not so long ago when the murderous savages made the near vicinage very uncomfortable. The log buildings then forming part of those occupied are now removed to the higher ground. The wells that supply the garrison are on the old site, and the water is pumped by an engine to the summit of a small rise to the east, and then distributed. The present post is made for four companies; there are two at present. The buildings are in the usual frontier post fashion—built around an open plaza, or parade ground; on one side being the detached houses used for officers' quarters and the commandant's residence, now occupied by the commanding General. On the south side are offices, on the north the men's quarters, and on the west the guard house, and post library and reading room, which is quite a pleasant place, fairly supplied with books and papers. To the rear of the barracks are the buildings used for the company laundresses and other purposes. As the reservation is crossed coming from the town, and before reaching the post proper, there is a group of buildings used for Department purposes, which exceed in interest those of the garrison proper. Most of the buildings are adobe, or *cojon*—a sort of adobe or mud wall, run in boxes, as we build concrete walls. These make good houses, and are better, though not perhaps as shapely, walls as those made of the regular adobe, or sun-dried brick. Finished on the outside with cement or plaster, they make both durable and good-looking buildings. The post hospital is a superior specimen of *cojon* building, and its arrangements for hospital purposes are rarely surpassed. Its neatness, cleanliness, excellent ventilation, and well-devised construction are a credit to those in charge. This building, with others, was constructed by the labor of the soldiers, at very little cost to the government.

Fort Yuma, California, is in latitude 32 deg. 23 min. 3 sec., longitude 37 deg. 33 min. 9 sec., altitude 267 feet above tide-water, and at the highest point of the rocky bluff on which it is built, 110 feet above the bank of the river. The Colorado river, after receiving the Gila, 180 miles above its mouth, bends to the west, and forces itself through a rocky defile 70 feet in height, 350 yards long, and 200 yards wide, thus isolating a rocky bluff, now on the California side of the river, having been shifted many ages since from the Arizona side; but during high water it is an island. On this bluff, in the midst of its two embracing rivers, rises Fort Yuma, white and parched, above the broad sea of green of the river bottom here seven miles wide, covered with a dense growth of cottonwood and mesquite. Chains of low, serrated hills limit the view, all bare and gray, except when sun-painted with delicate tints of blue and purple. This post is remarkable for its intense heat, the results of which will be considered in the chapter on climate. Its historical reminiscences will be found in the chapter on towns and cities.

By an Act of Congress approved March 3rd, 1873, the sum of $50,311.80 was appropriated "for the construction of a military telegraph line from San Diego, Cal., via Fort Yuma and Maricopa Wells, to Prescott and Tucson," to be expended under the supervision of the quartermasters' department of the United States army, under which appropriation 540 miles of line were built at seventeen posts to the mile. Fearing that the appropriations might be defeated, a sum sufficient to equip the line with good posts was not asked for, which occasioned some adverse criticism unwarranted by the facts. By an Act approved June 23rd, 1874, $40,000 were appropriated to enable the line to be extended to Camps Verde and Apache, and payment of running expenses of the previous line was authorized to be made from its receipts. In pursuance of instructions from headquarters of the Army, on August 27th, 1874, Lieutenant Philip Reade, third U. S. infantry, was relieved from active duty in the Department of Missouri and ordered to take charge of the military telegraph and its construction. By an Act approved March 3rd, 1875, $30,000 were appropriated for the extension of such lines in Arizona and New Mexico. In July, 1875, Lieut. Reade arrived at San Diego, and there



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FORT YUMA

assumed control of the military telegraph lines, between 500 and 600 miles of which were then in operation from San Diego to Tucson via Maricopa Wells, with a branch to Prescott. Detachments of troops were that summer occupied in extending the lines to Camps Grant, Apache and San Carlos, and into New Mexico. The commander of the Department in his annual report characterized it as "an invaluble means of transmitting orders," by which he was greatly aided in his administration. The insufficiency of the appropriation for the purpose was made up by the liberal contributions of citizens in New Mexico, and the zeal of the soldiers engaged in its construction, under the efficient superintendence of Lieutenant Reade; and in the course of the following spring the line was completed to Santa Fé. It is now a complete success, both as to charges and efficiency, charging but twenty-five cents for ten words 600 miles, and accumulating a surplus fund at that, though operated in a country very sparsely settled at about one-sixth the rates usually charged by private companies. Between San Diego and Yuma the poles, twenty-five feet in height, are frequently covered up with sand by storms, and Lieutenant Reade desires to replace them by a cable, which would soon save its own cost. The Government telegraph has no stock to water, no dividends to make, no retinue of high-salaried officials, no pets to favor. Our soldiers thus found adequate to the requirements of ordinary life, should receive more consideration in the way of appropriations; and it is much to be regretted that, under instructions from Washington, the military operators are forbidden to furnish items of general news for the press, for which service they receive a small but welcome addition to their meager pay. So appreciative of its benefits are the people of Mojave, that they offered to pay $2,500 cash and a liberal supply of material for its extension there. When the facts connected with the success of the military telegraph are carried to their logical deductions, some important conclusions follow, going to the very core of problems connected with government.

CHAPTER XIII.

CLIMATE.

Physiological and Pathological Effects of Heat. Its Remedial Properties. Distinction between Dry Heat and Sultry Heat. Temperature at Various Places. Healthfulness in Changes of Temperature. Changes in Amount of Rainfall. Effect of Cultivation. Modus Operandi of Death from Thirst. Effect of Stimulants. Hot Springs and Saline Deposits.

The current proverb that tastes are not appropriate subjects for controversy has no more pointed illustration than the diversities of climates on the earth's surface, and their corresponding adaptability, not only to the different races of the *genus homo* but to different individuals of the same race. There is no portion of the Union of the same area that is more accommodating to these diversities than Arizona. Beginning at its western portal, Yuma, J. Ross Browne, who was there a short time in the winter of 1863, thus describes it in his book entitled "The Apache Country": "The climate in winter is finer than that of Italy. It would scarcely be possible to suggest an improvement. I never experienced such exquisite Christmas weather as we enjoyed during our sojourn. Perhaps fastidious people might object to the temperature in summer, when the rays of the sun attain their maximum force, and the hot winds sweep in from the desert. * * * I have even heard complaint made that the thermometer failed to show the true heat because the mercury dried up. Everything dries; wagons dry; men dry; chickens dry; there is no juice left in any thing, living or dead, by the close of summer. Officers and soldiers are supposed to walk about creaking; mules, it is said, can only bray at midnight; and I have heard it hinted that the carcasses of cattle rattle inside their hides, and that snakes find a difficulty in bending their bodies, and horned frogs die of apoplexy. Chickens hatched at this season, as old Fort Yumans say, come out of the shell ready cooked; bacon is eaten with a spoon; and butter must stand in the sun an hour before the flies become dry enough for use. The Indians sit in the river with fresh mud on their heads, and by dint of constant dipping and sprinkling manage to keep from roasting, though they usually come out parboiled."

Perhaps if he had been there in summer the description would have been less piquant in some directions. As will be subsequently perceived, the exhaustive effects of a given degree of heat vary very greatly in different localities. An explorer thus relates his experience of the summer climate in the Colorado valley, principally between Ehrenberg and Camp Mojave: "From the middle of June to the 1st of October panting humanity finds no relief from the heat. As soon as the sun appears above the horizon its heat is felt, and this continues to increase until a maximum is reached about three o'clock in the afternoon, after which the temperature falls slowly, and oftentimes very slowly, until sunrise. During the hottest part of the day exertion of any kind is impossible; even while lying perfectly quiet the perspiration oozes from the skin and runs from the body in numerous streams. Everything feels hot to the touch, and metallic objects cannot be handled without producing blisters upon the skin. The white sand reflects the heat and blinds the traveller by its glare. Rain scarcely ever falls during the summer months, and not more than three or four inches of rain the year round. The atmosphere is so dry and evaporation so rapid that the water in our canteens, if the cover was kept moist, kept a temperature of 30 deg. below that of the air. Great quantities of water are drank during these hot days, and no uncomfortable fullness is experienced. One gallon per man, and sometimes two, was the daily consumption. Notwithstanding the excessive heat, no sunstrokes occurred, although we were at one time exposed in a narrow cañon to a temperature of 120 deg. All of the party preserved good health during the summer. There is no danger of catching cold in this climate, even if wet to the skin three or four times during the day or night. No dew or moisture is deposited during the night, hence no covering is required. The hot wind which blows frequently from the south is the most disagreeable feature of the climate. No matter where you go, it is sure to find you out and give you the full benefit of a gust that feels as if it issued from a blast-furnace, and parches the skin and tongue in an instant. Then there is no recourse but to take copious draughts from the canteens to keep up the supply of moisture in the body. If water cannot be obtained, the delirium of thirst soon overpowers the unfortunate traveller, and he dies a horrible death."

Dr. Loew, of the Wheeler exploring expedition, makes comparisons of temperatures and atmospheric humidities between Fort Mojave and other portions of the globe noted for extreme heat as follows: The mean temperature of the hottest month is, in—

	Degrees C.	Degrees F.
Cairo, Egypt	29.9	85.8
Madras, India	31.8	89.2
Abushar, Persian Gulf	34	93.2
Llanos of Caracas	31.5	88.7
Shimmedru, Sahara	35 to 36	95 to 96.8
Rhademes, Sahara	32.1	89.6
Ghadames, Sahara	32.4	90.3
Fort Mojave, Colorado river, Arizona	34.2	93.6

In regard to the relative humidity of the air, great variations may, *a priori*, be expected where the daily extremes of the temperature are great. Thus, the relative humidity of August 6 was, at sunrise, 0.526, (saturation = 1.0) while at 3 p. m. = 0.093. Rohlfs observed as the mean relative humidity in August at Ghadames, (Sahara) = 0.330, and in July = 0.275. The lowest relative humidity was found in November, 1865, at Murzuk, (Sahara) at 0.07, (dry bulb = 82° F., wet bulb = 55° F.) But not only the *relative* humidity is subject to a great range, but also the *absolute*. While this was observed in the Colorado valley, after a heavy shower, to be increased to 15 grams per cubic meter, it amounted at dry weather only to 6, sometimes 3.

The general law, as deduced from comparisons of the temperatures and humidities at the various military posts throughout the United States, and from other sources of information, is that the dryer the air the greater the diurnal variations of temperature. At Cottonwood Island, Col., on July 12th, this difference was 44°. On the plains of western Nebraska and Kansas it is often 40°. At Rhadames, on the Sahara desert, August 15th, the diurnal variation was 27°, and on August 11th, the maximum temperature at the same place was 111°. At Shimmedru, in the oasis Kauar, the afternoon temperature for several days in succession was 127°. But the Colorado valley is still equal to the occasion, as a temperature of 122° was repeatedly observed by members of the exploring expedi- at Fort Mojave, where on summer nights it sometimes sinks to 70°, but is not often below 90. At St. Thomas, Nevada, 24 miles from the Colorado, the temperature for three weeks in

1871 is said to have risen daily in the afternoon to 123°, and on one day to 127°.

The following table summarizes temperatures and rainfall at Forts Mojave and Yuma, for 1873–4.

Fort Mojave.

MONTHS.	Mean	M'ximum	Minimum	Rainfall Inches.
July	100	118	47	0.00
August	92	116	52	3.80
September	90	108	45	0.00
October	75	105	27	0.00
November	66	89	36	0.50
December	52	67	29	2.80
January	56	70	27	0.10
February	53	69	29	5.00
March	62	80	30	0.20
April	72	96	54	0.10
May	83	107	63	0.90
June	93	111	75	0.00
				13.40

The average annual rainfall at Fort Mojave, however, is but a little over five inches.

Fort Yuma.

MONTHS.	Mean	M'ximum	Minimum	Rainfall Inches.
July	94	112	69	0.60
August	88	106	71	1.00
September	85	104	59	0.00
October	73	100	48	0.00
November	66	86	46	0.00
December	53	68	30	0.64
January	56	72	37	0.55
February	54	70	35	0.85
March	59	82	40	0.20
April	69	96	45	0.00
May	80	102	50	0.00
June	89	108	66	0.00
				3.84

So far as to the *facts* of temperature. We will now consider *results*. The following is an extract from a letter of ex-Governor Safford on the sanitary aspect of the question: "Observation and residence in the Territory during the past eight years, have convinced me that this climate is superior to any found elsewhere for the cure of pulmonary diseases. I have known a large number of people to come here who were in rapid decline, who have been restored to excellent health.

For several years before coming here I had been afflicted with a severe cough, and my lungs were undoubtedly badly diseased. I traveled extensively, which only gave me temporary relief. I commenced improving as soon as I reached this warm, dry climate. Within six months the cough left me, but for several years afterwards would return as soon as I changed from this climate to that of California or the Eastern States; but now I consider myself completely cured, and do not find any difficulty upon going to San Francisco or elsewhere, as I formerly did. My experience is the same as that of nearly every person who has given this climate a fair trial. It is an admitted fact that no medical treatment has yet been discovered that will cure pulmonary consumption. The strong hold of the disease, where it germinates and most successfully carries on the havoc of death, is found in cold, damp climates, where every respiration feeds the disease, and the victim is hurried to a premature grave. It is reasonable to suppose that a different climate will correspondingly benefit the afflicted. In Arizona the warm, dry atmosphere acts as a healing balm to the bleeding, diseased lungs, while the pores are kept open and the impurities of the system, that in harsher climates make a combined attack upon weak lungs, are allowed to escape through the skin. It is true, to insure a cure, the patient must expect to undergo privations and often hardships. An out-of-door life is very necessary. Constant traveling and sleeping out-of-doors at night have been found very beneficial. The patient needs something to constantly divert his attention from the disease. Traveling and seeing new scenes do this to a great extent, while exercise insures a good appetite, and the pure, warm atmosphere affords a curative application to his diseased lungs as often as he breathes. Yuma, during a greater part of the year, is probably the best place for this class of invalids; while perhaps, during the warm season, the patient could travel to advantage, and live in the interior. While I am aware that, should Arizona become a resort for invalids afflicted with pulmonary diseases, it would be the means of adding much profit to the business of the country, still I hope and believe this consideration has not induced me to make prominent the advantages of this climate. This class of unfortunate people has enough to contend with, without being lured away from home and friends by our holding out false hopes; but the universal relief given to persons afflicted with these diseases that has come under my observation warrants what I have said."

Still more decisive is the following testimony of Dr. A. M. Loryea, of the Hammam baths, San Francisco: "Having travelled all over the world to investigate the effect of heat upon the human body in health and disease, my experiences and experiments in Yuma, Arizona, resulted more favorably than at any other place, and I can safely say that its climate is superior to that of any spot on the American continent for the cure of Bright's disease of the kidneys, consumption, rheumatism and neuralgia. While the heat is high, as exhibited by the thermometer, yet from the dryness of the air one does not feel oppressed, and breathes easily, and can, by using the proper means, keep in a most comfortable condition. Another great desideratum of the climate of Yuma is the complete absence of *malaria*, thus affording every quality necessary to entitle it to the name of the great sanitarium of the North American continent. My friend, the distinguished surgeon of this coast, Dr. A. F. Sawyer, has been in the habit of sending there his patients afflicted with the diseases I have named, and is perfectly satisfied with the results; many having recovered their health, and all finding relief from their symptoms. It is nature's Turkish bath, and will relieve many of 'the thousand ills that flesh is heir to.' I cheerfully bear testimony to the good effects of the climate of Yuma, and if any invalid who has abandoned 'all hope' shall give it a trial, and obtain relief, this will be sufficient recompense for me to have written this."

As an instance of another disease cured by dry heat, a gentleman in business at Los Angeles, so much troubled with indigestion that he could scarcely appropriate the most delicate and digestible food, had occasion to remove to Indian Wells, in the Colorado desert, then the temporary terminus of the railroad. Here he could obtain nothing but the coarsest greasy food, badly cooked, and the most unsuitable conceivable for delicate digestive apparatus. The heat is even greater and drier than at Yuma. But, to his utter astonishment, he entirely recovered!

Well informed persons at Yuma claim that all the effects of heat there are beneficial; that the air being dry and pure, no malaria is absorbed. The temperature being uniform, free perspiration is exposed to no sudden checks. The passages through the system of copious drafts of water by exudation from the pores rushes out all effete and diseased matter; "the skin here throws off that which would elsewhere clog tubercular lungs, and gives them a chance to heal up. The same friendly office it here performs for diseased kidneys." Yet in

July, 1877, the thermometer reached 110° or more in the shade, for nineteen days in succession, sometimes reaching 114°. The heat, however, was said not to be oppressive. The rapid evaporation from the skin in the dry air cools the body, and makes a heat of 110° there more agreeable than one of 90° in New York, or 80° in Washington, while the low elevation gives an atmosphere sufficiently dense to amply oxygenate the blood, without gasping, as in elevated mountain districts, in some of which pneumonia is said to be epidemic, while in Yuma it is unknown. The air at all times and places contains more or less water in the form of perfectly invisible vapor, however dry and warm may be the weather. The higher the temperature the more vapor it can hold without reaching the point of saturation, when precipitation and rain occur. Hence, in climates that are hot and not dry the air is sultry and oppressive, as experienced just before a thunder-storm, so that a dry heat of 110° in such localities as Fort Yuma and the interior of southern California is less oppressive than a temperature of 80° or 90° where the atmosphere is highly charged with aqueous vapor, as in many eastern and most southern cities on the Atlantic coast. At an *equal* temperature the perspiration is much less in a dry than in a sultry heat, exertion correspondingly less fatiguing, and sun-strokes almost or quite impossible. Herbert Spencer remarks that if we look at maps showing the comparative meteorological conditions of all the countries of the globe, and note the belts marked "rainless," we shall perceive that from these have come the conquering races of mankind.

For a considerable distance on the stage road eastward from Yuma the temperatures vary but little. At Florence it is still very warm. At Phœnix, on the Salt river, the heat in summer is less oppressive. At Camp McDowell, on the Verde, not far above Salt river, and twenty miles from Phœnix, the climate is warm and dry, the nights are not oppressive, and the locality not malarial. The annual rainfall varies from five to twenty inches. At Florence, and in the Gila valley generally below it, the heat in summer is very great. It is a general law that in river valleys the range of the thermometer both ways is greater than on the foot-hills of the adjacent mountains, and in various portions of California a "thermal belt," nearly or entirely free from the frosts which are frequent on the mountains above and in the valley beneath, is known to exist. The observations made in connection with Wheeler's Exploring Expedition of 1876 in the vicinity of the upper Gila, indicate that there are similar localities in south-eastern Arizona. These observations are to the effect that in the Gila valley, near the Rio Francisco, at an altitude of 4,500 feet, the temperature at sunrise on October 18th was 14 deg.; but near the line of New Mexico, on a wide plain, at a height of 5,200 feet, it was 40 deg. at sunrise of the day following, and on October 20th at sunrise at the foot of the Burro mountains, N. M., 6,100 feet altitude, it was 42 deg. At Eureka springs, in the valley near Camp Grant, September 22nd, the temperature at sunrise was 44 deg., and the altitude 4,900 feet; but at Camp Grant, 500 feet higher, it was 53 deg. at the same time. Camp Grant is evidently in the "thermal belt"; its diurnal variations of temperature are from 15 to 30 deg., according to the season; the monthly range is about 30 deg., and the yearly extremes of cold and heat are 34 and 96 deg., respectively. The average cloudiness is 2.37; there are annually about sixty days of rain and hail, and five days of snow. It appears to be in all respects a medium climate, capable of a large variety of vegetable production. The following table exhibits the details:

MONTHS.	Highest	Lowest	Mean	Diff. Dry & Wet Bulb.	Rainfall Inches.
1875.				° °	
January	63	35	49	2 to 4	0.26
February	71	34	52	2 to 6	0.24
March	68	36	52	1 to 10	0.44
April	81	53	67	1 to 3	....
May	90	60	75	1 to 9	0.06
June	96	63	80	1 to 3	0.65
July	87	68	78	3 to 4	5.27
August	92	60	76	6 to 13	7.41
September	84	52	68	4 to 7	1.99
October	79	47	65	4 to 8	2.86
November	78	43	60	2 to 6	1.00
December	66	43	55	1 to 4	....
					20.18

At Camp Bowie, though it is at nearly the same altitude as Camp Grant, (seventy-four feet less) and only about fifty miles south-east of it in a direct line, the climate is very different, owing to a difference in local position. The monthly range is twice that of Camp Grant, and the yearly range from 20 to 103 deg. It has frost in from three to five months of the year, and occasional falls of snow. The annual rainfall varies from fourteen to twenty inches, principally in July and August, and in the winter months.

At Camp Lowell, seven miles east of Tucson, the heat in summer is very oppressive by day, but the nights are cool and pleasant. The diurnal range, greatest in August, September, and October, sometimes amounts to 70 deg. Malarial diseases are prevalent during the latter part of the summer and fall, but pulmonary affections are uncommon. It is one of the most extreme climates in Arizona. In 1873–4 the extreme range in October was 80 deg., the yearly range in that period being 92 deg. In 1871–2 the extremes were 17 deg. in November and 118 deg. in June. In January, 1872, the thermometer touched 18 deg., while in July, 1871, it reached 114 deg., and in the preceding month 116 deg. In the adjacent town of Tucson the temperatures are given at 7 A. M. and at noon for each day from May to October inclusive, 1876, from which are deduced the following averages and extremes:

MONTHS.	Mean.		Highest.		Lowest.	
	7 A. M.	12 M.	7 A. M.	12 M.	7 A. M.	12 M.
	°	°	°	°	°	°
May	72	82	81	90	66	73
June	81	90½	89	102	70	79
July	84	91	90	98	78	82
August	80½	86½	87	98	75	80
September	78	86½	86	92	72	78
October	68	80	78	90	60	72
October 1st–13th	75½	85	78	90	71	82
October 14th–31st	65	75	72	81	60	72

The temperatures at 7 P. M. are usually two to three degrees less than at noon. The preceding table, from the times at which the observations were made, evidently fails to secure the lowest temperatures. The diurnal variation appears to be much less at Tucson than at Camp Lowell, though the two places are so near each other. These great differences in localities not far apart are usual on plains considerably traversed by mountains. Camp Apache, on the south-western slope of the White mountains, at the altitude of nearly 6,000 feet, has an extreme climate, the yearly range being from 6 deg. or below to 104 deg.; and monthly range, 40 deg. in summer and 50 deg. to 60 deg. in fall and winter; the nights are always cool, the winters severe, and snow storms frequent from December to April; the spring months are warm and dry; vegetation does not, however, start much until the summer rains, which extend from June to September, during which period few days pass without heavy showers and thunder-storms. The following is the record of temperature for 1873–4:

MONTHS.	Mean	Highest	Lowest.
July	79	104	60
August	71	88	66
September	70	92	52
October	59	92	28
November	48	81	25
December	34	62	6
January	27	68	6
February	36	65	10
March	43	72	18
April	50	88	31
May	64	94	38
June	75	101	57

Camp Verde, being in a valley about seven miles in width at that point, bordered by mountains and much below the usual level of the surrounding country, has a generally warm but extreme climate, ranging from 5 deg. to 113 deg.; during summer the days are very hot; the monthly range is from 50 deg. to 70 deg. The average annual rainfall is about eight inches. At Fort Whipple, (Prescott) though only distant about forty miles west in the same latitude, the climate is entirely different, this post being on an elevated plain, about 3,000 feet higher than Camp Verde. The heat in summer is genial without being excessive, but the cold in winter is rather severe. On the whole, the climate is pleasant, healthy and very bracing. The following is the meterological record for 1873–4:

MONTHS.	Mean	M'ximum	Minimum	Rainfall Inches.
July	79	91	65	1.56
August	73	85	64	4.78
September	69	82	50	0.30
October	56	81	33	0.00
November	47	72	29	0.80
December	35	65	10	2.55
January	39	67	17	5.51
February	35	55	10	5.68
March	42	65	20	3.56
April	50	75	34	1.70
May	61	82	41	0.65
June	72	88	55	0.00
				27.09

The subject of climate in its relation to the human organization is one of great and practical interest, individual requirements in that respect varying greatly even among persons in the same family. Some are well adapted to an almost continuously hot climate, and would be suited in the Colorado valley; hot summers can be had in almost any of the valleys, combined with pleasant winters. There are vegetable productions, (such as the persimmon of the middle States, which is ripened by frost) that require extremes of temperature at different seasons for their complete development. And there are corresponding human constitutions needing extreme climates to bring out their full strength. On the mountain slopes of Colombia, South America, the climate cools gradually with the degree of elevation, but in any one locality varies only about 10 deg. Fahrenheit annually; but so far is this strictly even temperature from being conducive to health, that residents there frequently have to leave their homes in order to obtain the requisite variation. For such persons as require a wide range of temperature during the year, or from day to night, most parts of Arizona are well adapted; while those who desire a genially warm, rather bracing climate, not having too great a range, would find it on the mountain slopes of the south-eastern portions.

The subject of climatic changes is one that has engaged the attention of Dr. Loew and other explorers. In reference to the Mojave desert, California, he remarks as follows: "If, on the one hand, desiccation of former lakes proves the amount of evaporation to exceed that of the aqueous precipitates, there exist on the other hand facts tending to prove that the dryness of the climate is still on the increase, viz: the disappearance of forests within the last three centuries, and the drying up of springs within the last fifty years. The miners of El Dorado cañon, in the Black cañon range, stated to me the ceasing of a large spring in the vicinity within the past fifteen years. Indications of increasing dryness in New Mexico and Arizona are numerous; to mention only the forests of dead cedar trees, standing mummy-like, the occurrence of shells of land snails (*planorbis*) in localities where not a single snail is found at the present day, the deserted ant-hills, the dry arroyos, and the ruined towns of now barren tracts. In connection with the decrease of aqueous precipitates in New Mexico, Arizona and eastern California, appears to stand the increase in Utah, the Great Salt lake having risen fifteen feet in the last twenty-five years. Changes of level give the most satisfactory explanation. A gradually rising country will experience a decrease in the annual mean of temperature, consequently also in the amount of evaporation; while on the other hand the aqueous precipitates will increase, the distance of the clouds gradually becoming smaller. As the attraction grows with the square of proximity, a lifting of 100 feet of an extensive mountainous country will suffice to change the climate perceptibly. Two causes, therefore, co-operate to increase the number and volume of springs, and to swell creeks and lakes. My hypothesis is that New Mexico, Arizona and eastern California are undergoing a gradual subsidence, while Utah, like the coast of California, is being slowly upheaved."

Other causes than changes of level, however, seem sufficient to account for most of the phenomena. The ancient inhabitants of Arizona are known to have irrigated very extensively, proving the climate to have been about as dry then as now. The rise of Salt Lake is attributed by others to increasing cultivation, which operates to diminish evaporation and increase precipitation, as in Egypt and some portions of the south of France. Lieutenant Wheeler considers it probable that were five millions of acres in Arizona and adjacent regions brought under cultivation by means of the streams that rise in the Sierras; the local surrounding climate would "undergo slow changes, so that the atmosphere changed with humidity from this immense evaporation (that would take place in a cultivated region) will bring about its own deposit of rain, thereby causing a temporary vacuum, as it were, into which would fall portions of the moisture at that time on its passage to the higher regions." The present rainfall is known to vary all the way from half an inch to thirty-two inches, and probably much higher at a greater altitude than 6,000 feet. As bases of comparison, it may be stated that the usual annual rainfall in San Francisco and the lower Sacramento valley is from twenty to twenty-five inches, which is about that in some of the interior portions of New York and the driest parts of England. In the eastern cities near the sea-board it is from forty to forty-five inches. At Camp Thomas, Arizona, it is thirty-two inches; and there are large areas in Arizona where it is from twenty to twenty-four inches—double that of the inhabited portions of southern California, with the advantage as to season.

It is on an extensive area naturally destitute of water, and in hot climates, that the great danger of the desert is manifested in a thirst that, painful elsewhere, is very liable to become fatal. Dr. Oscar Loew, of Wheeler's expedition, has reached some very interesting data and conclusions on the *modus operandi* of excessive thirst, from which we extract the following:

"It is in but comparatively few regions of the earth that the temperature of the air rises above blood-heat for weeks and months in succession; hence, our knowledge of the physiological changes produced by it are quite meager. When it is considered that under ordinary circumstances the whole tendency of the human system is directed toward keeping its temperature *above* that of the surrounding air, the task is suddenly reversed in the hot deserts, where the thermometer rises for considerable periods daily up to 110 deg. to 116 deg. F., in some cases up to 120 deg., while the normal temperature of the blood is 98.5 deg. F. What a change in the conception of hot and cool is undergone in such a climate, when it is found *agreeably cool* in the evening when the thermometer has descended from 110 deg. to 94 deg. F! Observations on pulsation and respiration which were made, proved that the former was generally much increased, while the latter showed but a slight, sometimes no increase. If it is considered that the temperature of the body is but 98.5 deg. F., it is surprising that in a heat of 110 deg. to 116 deg. it is not increased more than one or two degrees above the normal temperature, although inner heat is being produced by breathing and oxidation that is continually going on in the blood. That a decrease in the assimilation of food forms one condition is doubtless true; but the principal factor is an enormous evaporation from the body, which to determine quantitatively appeared a matter of great interest. From a series of observations made during very hot days, (108 deg. to 114 deg. F.) measuring the amount of water drank and the volume of urine secreted, the conclusion was arrived at that two litres of water leave the body in the gaseous state during the twelve day-hours. If, however, engaged in heavy work, such as packing mules, climbing mountains, etc., the amount is nearly doubled. The volume of urine was found to average only one-twelfth to one-fourteenth of water drank. The latter had generally 70 deg. F." From mathematical formulæ based on the laws of heat, the temperature of the blood, and the consumption of water in the system, he concludes that the higher or lower temperature of the water drank has but little to do with the cooling of the body, which is almost wholly effected by the amount of heat rendered latent resulting from the conversion of two litres of water into vapor; this amount, by a formula of Regnault, he calculates to equal 31.7 deg. Fahrenheit in twelve hours, or 2.6 deg. per hour, the same being the degree in which the temperature of the body is raised when no more water is available for evaporation.

That is, about this quantity (two litres of water in twelve hours) is needed at those high temperatures to keep the heat of the blood down to its normal temperature. "How soon a person must succumb from thirst in such a hot climate becomes evident. The first symptom is delirium, and when arrived at that state the efforts to save are rarely crowned with success. A number of cases were related to me where helpless sufferers have been picked up, but died after one or two days, in spite of all care bestowed upon them. Even old pioneers, miners in the mountains, who were well acquainted with the dangers of crossing the desert in a new direction, deviating from the old trails leading to water, perished, overcome with thirst and fatigue; not by sunstroke, which is almost unknown there. It appears that this latter calamity only takes place when the hot atmosphere is at the same time charged with humidity, interfering with the free evaporation from the body. It is evident that by drinking large quantities of water, the blood must acquire a high degree of dilution; hence all the juices, those of digestion included, the gastric and pancreatic, must be more diluted than usual, and the power of digestion weakened. Therefore, but a limited amount of food is assimilated, no matter how much is eaten, and a great deal leaves the body undigested, with the fœces, which generally are of a thin consistency. As another consequence we observe the decrease of muscular power; every exertion requires an increase of combustion, whose result, the heat, has to be converted into mechanical force. But everything tends here to keep the combustion at a low state. Hence it is preferable to be vegetarian in this climate, as consumption of meat produces an increase in the number of blood-corpuscles, the absorbers and carriers of the oxygen, the oxidizing surface." The Mojave Indians inhabiting the hot Colorado valley, are exclusively vegetarians. It is worth mentioning, that after consuming fatty matter a considerable portion is exuded unchanged by the skin. It is also observed that while meat increases the thirst immensely, fat suppresses it considerably. This is contrary to current views, but serves to explain the extreme liking of Arabs for 'ghee,' or liquid butter." He continues: "Repeatedly I was assured that in crossing the desert, alcoholic drinks and tobacco have a very injurious effect, as a person using them succumbs much sooner. A resident of St. Thomas, southern Nevada, stated that two or three days previous to undertaking a desert trip, he abstained from any stimulating material." A singular combination of the proverb that "extremes meet" is that the effect of touching metals in extreme heat and extreme cold is similar; that fat is also stated to be desirable, and even necessary, in cases of exposure to extreme cold, forming therefore a large portion of the diet of Greenlanders and Esquimaux; and that alcoholic drinks are as likely to aggravate the risk of being frozen to death by extreme cold, as that of perishing from extreme thirst on hot deserts.

Inhalation, as an artificial provision for reaching diseased organs by means of respiration, has of late years become conspicuous as a curative agent. It is obvious, however, that whatever benefits may arise from artificially inhaling chemical substances occasionally for a few minutes, must be largely increased if the patient can be taken to localities where the air is exactly suited to the requirements of the diseased organs, and consequently where the curative process is continuous. As an aid to the influence of air, that of warm or cold water in unlimited quantities, with more or less of special medicinal properties, is also very desirable. And in this respect Arizona is already found not to be deficient, though little explored. In the Grand cañon of the Colorado there is a hot spring of the temperature 89 deg. There are said to be warm springs near Burk's station on the Gila river, on the Prieto river, on the mesa near Camp Lowell, in the vicinity of Camp Thomas, and near Tubac; but nothing is known as to their temperature or constituents. On a wide plain between the Dos Cabezas and Dragoon mountains, a salt deposit covers several square miles. Here there are two small ponds, the waters of which are completely saturated with salts, and have a decided taste of carbonate of soda; yet numerous ducks are seen. The bitter springs of Mineral Park have been already mentioned. The water contains in one hundred thousand parts, 118.5 calcium sulphate; 65.8 magnesium sulphate; 5.4 magnesium chloride; together with traces of the sulphates of sodium, manganese, and iron, but no trace of potassium or lithium. In a dry wash leading from the Detrital valley (Forty-mile desert) to the Colorado river is a gypsum spring, the water from which has a faint odor of sulphureted hydrogen and a strong saline and disagreeable taste. The geological formation consists of a red, triassic sandstone and conglomerate, with gypsum and salt deposits. In 100,000 parts of the water are contained chl. sodium, 397.8; sulph. sodium, 51.6; sulph. magnesium, 172.8; sulph. calcium, 130.1; carb. calcium, 12.0; with traces of chl. potassium and carb. magnesium. The Monroe Hot Springs, however, seem to be in advance, for practical purposes, of anything of that kind yet found in the Territory. They are on Castle creek, about sixty miles south of Prescott, *via* Walnut Grove, Oak Flat, and Willow creek. The spring issues from granite rock at the head of a small cañon in which flows about twenty inches of water for about half a mile through a dense growth of cane and tule to the mouth on Castle creek, where it sinks in the sands. The temperature of the water at the spring is 150 to 160 deg.; but sinking to 130 deg. at about two hundred yards below. It has not been analyzed, has a very agreeable taste when cooled, can be drank in large quantities without inconvenience, resembles snow-water in taste and feeling, will wash clothes with no soap and very little labor. It has no disagreeable smell or nauseous taste; yet is believed to be curative. In summer the temperature of the air is high, but a cool breeze blows up Castle creek cañon. The altitude is about 1,500 feet. Two hundred yards below the springs the water flows over a rock about six feet in height, forming a natural shower-bath, into a pool in solid rock about four feet in width, ten feet in length, and four feet in depth. On about five acres of arable land vegetables can be raised there every month in the year, the warm weather being a sure preventative of frost; within a mile there is an abundance of grass; deer, quail, and doves are abundant. The mountains adjacent are thickly covered with the sahuara, a giant cactus; this, the prickly pear cactus, and tuny supply plenty of fruit; the juice of the latter when boiled down makes an excellent jelly, needing no sugar. California lions, coyotes, and especially an immense snake (which latter has not been heard from since the first account) seem to be the only drawbacks to a natural paradise.

CHAPTER XIV.

FAUNA AND FLORA OF ARIZONA.

MAMMALIA. BIRDS. REPTILES. THE ZONES OF VEGETATION. VALUABLE AND ABUNDANT FORESTS. STRANGE CACTI. INVALUABLE BOTANIC REMEDIES. A VEGETABLE SOAP. APACHE CONFECTIONARIES. TREE BEANS. THE SCIENTIFIC, THE CURIOUS, AND THE USEFUL.

I. FAUNA.

Among the mammalia of Arizona is the panther, cougar, or Rocky mountain lion, which has depopulated some of the former breeding places of wild turkeys, to a degree threatening their speedy extermination. One caught on the White mountain reservation weighed about a hundred pounds gross. There are also found in various portions adapted to their respective habits, two species of deer, antelope, mountain sheep with very large horns, pumas, jaguars, ocelots, foxes, peccaries, raccoons, opossums, prairie dogs, etc. The lynx or wild cat is extensively distributed. The American wolf, the wolverine, the prairie wolf and the badger are uncommon. Grizzly bears are common at Camp Apache, and have been killed near Bill Williams mountain. The Coyotero, Mogollon and White mountains are the homes of cinnamon and black bears, which are also found in the hilly and wooded country of Arizona generally. The wood rat is good eating, its habits being entirely different from those of the house kind; its availability in that direction is fully appreciated by the Apaches. The Rocky Mountain rat and the white mouse are also found in the Territory, and the black-faced gopher is astonishingly numerous on the White mountains. The kangaroo rat and the yellow and tuft-tailed kangaroo mice are also found in some parts. Squirrels are well represented, both in number and variety, and include the tuft-eared, the Arizona gray, Fremont's chickaree, the four-striped and the pale four-striped squirrels; also the Gila chipmunk, which may be a variety of one of the preceding. The Rocky mountain chipmunk is uncommon. The lime-tailed squirrel is very numerous on the rocky hillsides near Camp

Bowie, where it is well known as an egg-stealer; and it is also found at Camp Apache. The American beaver is common on the tributaries of the Rio Verde. Hares and rabbits are represented by the Little Chief hare, the California hare, (found south of the Pinal mountains) and the sage rabbit, occasionally seen on the desert near the Gila.

Bats are numerous in some localities; the pale bat is a decided nuisance at Fort Yuma during the hot months, taking up its abode in the chinks and crannies of the officers' quarters, making them offensive from the multitudes crowded together, (a miniature Chinatown) and at night fluttering by scores about the rooms. Of other species, individuals are occasionally found. The little brown bat has been found in the south, in the deserts of which a specimen was secured of the horny bat, which is doubtfully distinct from the red or New York bat, and generally prefers higher elevations or latitudes. Of the Carolina brown bat, distinguished from other species by its peculiar dentition, a specimen was secured near Camp Apache.

In its birds, many parts of Arizona are so exceedingly rich in the number of species, owing to the great variety of climates, resulting from its contour of surface, that in a work of this character but little more can be done than to enumerate the species, state their usual habits, and summarize general results. The country between Camp Apache and the Gila river appears to be the dividing line between northern and southern birds; hence its vicinity is as interesting to the ornithologist as the Colorado Plateau and upper portions of that river and its tributaries are to the geologist. Camp Bowie, Camp Lowell, and the vicinity of old Camp Crittenden are also good ornithological stations. In fact, Arizona will prove to be the paradise not only of the geologist, as has been said, but of the scientist of almost every description. South of the Little Colorado, between Camp Wingate (N. M.) and Apache, a specimen of a bird allied both to the titmouse and warbler, of which but a single specimen had been previously known, was secured by a member of Wheeler's exploring expedition. In the same region was discovered the Mexican snow-bird, previously supposed to be an exclusive inhabitant of Mexico. Common on the edges of the pine woods and rocky ravines, though probably reaching far to the northward, is a large fly-catcher. Between the Gila and Camp Grant is seen the oriole. On Graham Peak, at an altitude of ten thousand feet, and at the base of the Santa Rita mountains, birds are numerous, both as to species and individuals, including humming birds, warblers, and the Mexican cross-bill. In the Sonoita valley the Arizona sparrow abounds, and near Camp Lowell is the cactus wren. The undergrowth of the stream near that post abounds in feathered life, including robins. The species of thrushes are numerous. The song of the crissal thrush, found in various parts of eastern Arizona, is is said to be "in sweetness of tone and modulation, almost unrivaled." Mocking birds nest in cactus, water ousels frequent the streams of the White mountains, blue birds of the various species are numerous in this and other elevated localities in the south-east. Wollweber's lead-colored and the yellow-headed titmouses are found in Arizona, the latter at Camp Lowell and on the upper Gila. The California nuhatch abounds in the mountains; several species of wrens are common in the south, and the western long-billed marsh wren is found in every locality suited to its habits. Warblers, swallows, fly-catchers and vireos are abundant of the several species. The Arizona vireo is rare though widely distributed; its song "might best be compared," writes a naturalist, "with the finest efforts of the solitary vireo; yet to the beauty and variety of notes of this bird, it adds all the charm and mellowness of expression which is pre-eminent in the song of the yellow-throated vireo." Townsend's solitaire is gregarious in the fall. The white-rumped shrike is rare south of 36 deg. There are several species of tanager; the song of the Louisiana tanager is "a short, simple melody, but beautiful from its extreme sweetness of expression." Sparrows and finches are very numerous, of wide range in regard to habit, and some species excel as natural musicians. The house finch, though by no means wanting in the wild districts, is most at home in civilization, resembling in nesting habits the English sparrow, but with the advantage of "a really beautiful song," being "prodigal of effort to please the ear." If duly cared for at first, they would probably be efficient in our cities and elsewhere as insect exterminators. Buntings, wagglers, grosbeaks, orioles, crows and jays are common and widely distributed. The belted kingfisher is occasionally found on the creeks and rivers. The western and Texas night-hawk are found on the Gila. The whip-poor-will is common; the white-throated swift nests in cliffs. Cuckoos are represented by the chapparal cock and the yellow-billed. There are about a dozen species of woodpecker in the south-east. There are several species of owls, two of which are remarkable in their habits for that class of birds. The western great-horned owl hides by day in deep cañons or thick cottonwoods, and sees perfectly in broad day-light. Another species found in the piny ravines of the White mountains associates in regular companies, and is abroad only in the earlier part of the morning and during the late afternoon. Hawks and falcons are found in localities appropriate to their habits. The golden eagle has been seen. An adult pair of the American eagle was observed in a cañon near Camp Apache, near which solitary birds are sometimes seen on the watch for fish. The Zuni Indians highly value their feathers as festive ornaments, and keep the eagles in wicker enclosures. The wild turkey is abundant from Camp Apache throughout the mountainous portion of south-eastern Arizona; the cañons near the head of the Gila and New Mexico sometimes swarm with them. They roost at night in the large cottonwoods by the streams, and by day feed on the seeds of grasses and upon grasshoppers on the dry hills. At Stoneman's lake and other portions of the road from Prescott to Fort Wingate they are quite numerous. There are partridges of several species. Aquatic birds, such as sandpipers, snipes, herons, cranes, rails, terns, etc., are not numerous, but are found in moderate numbers in the few localities to which they are adapted. The snow goose is said to winter on the Colorado; and the spring or pin-tailed duck has been seen on the San Pedro.

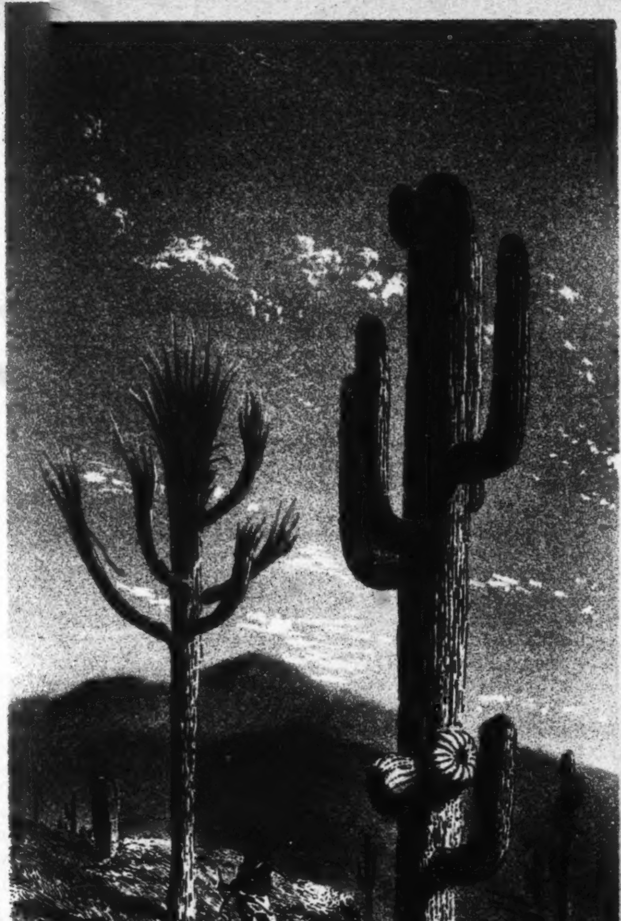
In Arizona and elsewhere not only birds but serpents are more numerous in the proximity of settlements, very few serpents, except the rattle-snake being encountered on the barren plains. Its rattle is easily mistaken for the noise made by the cicadas, though readily distinguishable by the difference of rhythm, that made by the cicada being shorter and more uneven. In one exploring expedition through Arizona and adjacent territories not over twenty rattle-snakes were observed during a ride of over 2,000 miles; but in 1873 many were found on the Gila. But if Arizona is less troubled as to quantity of rattle-snakes than has been supposed, it still excels in quality, as a species discovered there by Dr. Coues, and named *crotalus pyrrhus* is the most brilliantly colored of the genus, now known to comprise eighteen species, seven of which are peculiar to Arizona. The black rattle-snake, to which backwoodsmen attach an unusual degree of virulence, abounds in the White mountains. The *heterodon vasicus* (hog-nosed sand viper) was found as far south as Mineral Park. It is said to be entirely harmless notwithstanding the general belief to the contrary. The phenomenon known as mimicry of color is strikingly exhibited both by the serpents and lizards of this region; specimens seen upon the grassy meadows of the marshes being of brilliant colors assimilating to the general tint of the herbage, while those in alkaline plains approach the neutral tints of the ground and sage brush. In such of these as were found near red sandstone deposits, the normal colors were so altered as so lead to grave doubts of the species under observation. The horned toad, (*phrynosoma*) of the same species were observed to bear three different body tints in as many localities covered by one day's ride. But the most peculiar circumstance in connection with the latter is that after removal from the localities where found, (the colors in each case closely corresponding with the localities) the normal colors invariably returned within twenty-four or forty-eight hours. These animals are very numerous in Arizona, in which seven species are known; also three species of tortoises. The Gila monster is an overgrown, variegated, perfectly harmless lizard, of a species peculiar to Arizona, that lives among the rocks. One was secured 18 inches in length; its color was jet black and brick red, sometimes shading into buff. A specimen recently taken near Tucson, nine inches in length, is described as consisting principally of mouth, having the appearance of an embryo alligator.

II. FLORA.

Few countries of the same area present a better field for the scientific botanist than Arizona, or are excelled in extraordinary, spontaneous vegetable productions, some of which are of great practical value, and will be hereafter cultivated elsewhere. Dr. Loew, of the Wheeler Exploring Expedition, divides the "regions of the south-west" (including Arizona, New Mexico, southern California, etc.) into four distinct zones of vegetation, according to altitude: "(1.) Zone of cactus, yucca, and agave (mescal plant); altitude, 3,000 to 3,500 feet; grass is scanty; where there is water a most luxuriant vegetation springs up. (2.) Zone of obione and artemisia (grease-wood and sage-brush); altitude, 3,500 to 4,900 feet; grass is poor, with few exceptions, on granitic and volcanic soil. The cactus species are diminished in number. (3.) Zone of *juniperus occidentalis* (cedar); altitude, 4,900 to 6,800 feet; cactus species, few. (4.) Zone of pine and fir, 6,800 to 10,800 feet (highest points). These limitations descend more on eastern and northern than on southern and western slopes. Above 8,000 feet nightly dews fall. Cactus, however, grows at any level that is not too high, and in some parts of southern California does not grow as high as 2,000 feet, while the mescal or agave commences as low as about 1,500. The zone of *juniperus* includes that of the piñon, (*pinus edulis*) found at from 5,700 to 6,800 feet altitude. It furnishes food to the Indians and fuel to the whites. It is a crabbed shrub rather than a tree, usually less than twenty or twenty-five feet in height. Scrub oak and live oak (*quercus acrifolia* and *q. emoryi*) are associated with the juniper, which here and there is met with at altitudes of 7,000 feet. At the same height, on the San Francisco mountains, the raspberry and the gooseberry have been seen. The higher mountains are well timbered with conifers; the prevailing species being red, spruce and yellow pine. The great Colorado forest consists essentially of five species of conifers, viz: *pinus ponderosa*, (called yellow pine) *p. contorta*, (tamarac and red pine) *abies engelmanni*, (really a spruce, but called "white pine," as it has a soft, white wood) *a. menziesii*, (called balsam) and *a. douglasii*, known by many names. "These five species are by far the most abundant, large areas often being covered almost exclusively by but one or two of them." The mountain mahogany is often over thirty feet high, with a base two feet in diameter, the wood very hard, close-grained, dark-colored, and taking a beautiful finish when wrought.

Elias Brevoort, in his "New Mexico," writes: "The true pine belt of the interior portion of the continent ranges between six and ten thousand feet above the sea; here it secures the needful moisture in the form of rain, dew, or winter snow, and is also naturally associated with the protruded granite rocks which form the central nucleus of the higher ridges. It would be difficult to conceive of a more convenient distribution of these pine forests for railroad construction or transportation than that presented on the line of the thirty-fifth parallel." The San Francisco forest, above alluded to, reaches four hundred miles in length, from the 107th to the 114th parallel of longitude, from 109 to 114 deg. being in Arizona; it is from 80 to 100 miles in breadth, and is the largest block of forest land south of the 40th parallel. Along the creeks are the black walnut, sycamore, cottonwood, etc., and in the valleys and on the plains the valuable mesquite. In the vicinity of Camp Bowie is a remarkable variety of ferns, the flora there, though the height is about the same, being remarkably different from that of Camp Grant. The formation at Camp Bowie is limestone. Near the river San Pedro, *en route* from Sulphur Springs to Upper Crossing, there is a dense growth of acacia constricta, mesquite, and dwarf pines; near the Cienaga is a luxuriant growth of saccatone on the flats. The creosote plant is the prevailing vegetation on the hills. *Anemopsis Californica* and a *sarcostemma* grow abundantly on the damp ground near the water. The anti-scorbutics, portulacca, and chenopodium grow on the lower ground near Camp Lowell. The giant cactus grows in great abundance on the southern slopes of the Santa Catalina mountains. The southern sycamore, with its graceful, drooping leaves, grows along the streams. The bark is very clean and smooth, and almost pure white; the fruit is borne in clusters of four or five. The grama grass, abundant in many localities, is said to "contain more saccharine, in connection with more farinaceous and strength-giving, aliment than any other grass grown. Horses will live and do well upon it, but they must have it regularly in abundance, and be permitted to crop it from native pastures. It bears no flower, exhibits no seed, but seems to reproduce itself from the roots by the shooting up of young, green and vigorous spires, which are at first enclosed within the sheaths of their old and dried-up predecessors, and by their growth split and cast them to earth, and occupy their places." As a contrast, Dr. Rothrock states that animals become addicted to the use of the *hosachia purshiana* as an opium eater to his drug; they become demented, stupid, timid and dangerous by turns, growing weaker and thinner until death.

Foremost in the cactus family is the well known candelabra cactus by Mexicans called sahuaro. This plant, with its enormously tall, pale green and prickly body, from which extend at different places in different specimens gigantic arms, reaches at times the incredible height of fifty feet, although the average may be stated as from twenty to thirty feet. This disparity in size results from the different natures of the ground on which it stands. On the hillsides, among very rocky ground, where it flourishes in spite of all reasonable expectation, it hardly ever exceeds over twenty feet, while on the high tablelands, where it receives more nourishment from the sandy ground mixed with loam, it attains its most majestic proportions. Its diameter never passes two and a half feet where it is thickest, which is generally in that part where the arms spring from, or would be likely to do so, if it had any; for there are many of these giants of the desert that grow like an enormous straight column, without extending any branches, which on others issue from the mother trunk in more or less graceful forms, mostly inclining in a general bend upward. Toward the ground it generally tapers to a narrower diameter.



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THE SAGUARA

The outward part of this cactus is like its brothers, very fleshy, and with regular rows of the unavoidable prickles running over the whole length of its body. When a match is applied to the bottom of one of these rows it immediately takes fire, on account of its resinous contents, and gradually burns upward in quiet weather, while when the wind blows it flares in a few seconds to the very top, apparently without injuring the vitality of the plant. In this manner it is known that the Apache Indians have frequently made use of this cactus for the giving of signals.

The flower of this remarkable plant is in shape like that of all cacti; in color a pale yellow, blooming during the month of May, when it gradually fades, developing until June into a fruit called by the natives pitahaya. This fruit, when ripe, is in shape and size like a small pear. Its outer covering is of a light reddish-brown, which incloses a dark red pulp with small black seeds. This pulp is greatly prized by the Mexicans, who manufacture therefrom very palatable preserves, or boil it with sugar into a pleasant syrup. As this fruit only grows on the top of the plant or of its branches, the gathering would be a most tedious and difficult task were it not for the birds, who, in their eagerness to get at the pulp, use considerable violence in penetrating the rind, and thus generally detach the ripe fruit, which falls to the ground. To what age the candelabra cactus attains is a matter of mere conjecture, their growth being exceedingly slow, it would seem not above a few inches in a year. Still their last day comes—as whose does not?—and decay sets in. The first sign of approaching decomposition is a cracking of the fleshy outside, which detaches itself from the inner wood-work and gradually falls off, when there appears to view a hollow cylinder composed of narrow sticks or poles, growing united in the lower part and held together slightly in the upper part by (now dried-up) fibers. The plant is cut down, the sticks almost falling apart from the shock of the fall, and the easily parted poles are used for roofing principally; for fish poles, hen-coops, and other minor matters. Thus ends the giant of the plains. The prickly pear, or durasnillo, grows mostly on highlands, attaining an average height of from five to six feet, and is easily distinguished by its fleshy, round leaves, issuing almost immediately from the ground, and from one another. The leaves have an average surface diameter of from five to seven inches, and measure a little over one inch in thickness. Every year most of the leaves bring forth one or more new ones, which, while in their tender state and before the thorns come out, are gathered by the poorest classes and cooked, making a dish that tastes not unlike string beans. In the French colonies and in Africa this same cactus is found in abundance, known to every cavalryman under the name of *feuille de barbarie.* It is invariably used as a poultice whenever a horse has imbedded into his flesh a splinter or a thorn, which by the application of mashed leaves of this plant is gradually drawn out, without any inflamation or suppuration occuring. In Arizona the prickly pear cactus is frequently used in making solid earth floors, seeing that the water in which its leaves have been beaten into a pulpy mass has a peculiarly strong cementing capacity, and when properly mixed with a proportionate quantity of loam, imparts to floors an incredible durability. The pear-shaped, dark pink fruit of this plant is, I think, sufficiently known, under the name of prickly pear, as a palatable and pleasant fruit, which, eaten moderately, proves refreshing to the thirsty traveler, but when partaken of to excess is very apt to prove a serious inconvenience. On account of its singular shape, density of growth, production of eatable leaves and fruit, this cactus is quite frequently brought under cultivation, when it receives from the Mexicans the name of napal. Its leaves then increase greatly in size, become rather more oval; the plant shows few or no thorns, and assumes a bluish-green color. The flower, which in the natural state was the size of a small tulip, decreases considerably; while the fruit, discarding the shade of pink, now grows much larger, is better flavored, and remains a pale yellowish-green.

A very singular specimen of the variegated family of cacti is that commonly called "niggerhead," or by the Mexicans, bisnaga; of extremely slow growth, it never attains a height of over four feet, consists of a cylinder capped by a nicely rounded top, and covered all over by the roughest, sharpest and in every way most obnoxious thorns and hooks. These have been and are still, in the absence of the mercantile kind, used with success as fish-hooks; they answer for the purpose admirably, lacking only the barb, which would be demanding too much of a plant which produces and gives without cost several thousands freely. When this bisnaga, which grows on the foot-hills and high plains or mesas, attains the height of about two feet, it proves a blessing to the exhausted wanderer, inasmuch as all its juice, by surrounding it with fire, will retire into a cavity existing in its central part, whence by opening the plant it may be taken. The diameter of this cactus being generally about three-fourths of its height, nearly half a gallon of this fluid, which has a not unpleasant taste, may thus be obtained. The fruit of the bisnaga grows in a group on the top, is of a very bright yellow, and can be eaten in moderate quantities. The most despised, yea cursed, brothers of the family in question are four or five varieties of choya. One especially is the herder's and traveler's nightmare. It is the largest, attaining a height of ten to twelve feet, and probably the best description that can be given of it is, that it rises from the ground on two or three prickly stems about the thickness of a man's leg. These extend at the height of four or five feet into innumerable prongs, so thickly covered with clusters of thorns, which have a constant habit of falling off, that the original greenish color of the fleshy part is totally covered by the pale yellow of these millions of needles. And still birds do make their nests in these labyrinths of daggers, where no human finger can approach unscathed. All the choyas bear a small yellow fruit, but as even these are thickly covered with minute, invisible, and when tasted most disagreeable prickles, no use is made of them.

The century plant (aloe family) abounds on almost all the hills and mountain sides of southern Arizona. Its beautiful long leaves, of a singular grayish green color, extend from the root like the rays of a star to a length of from three to four feet, and end in a point armed by a very sharp and tough needle of a dark hue, brown or black. They are quite fleshy, and therefore stiff, carrying at regular intervals on their borders small, hooked thorns. From the center of the plant emerges a stem to the height of from eight to ten feet, from the top part of which issue short branches producing a yellowish flower. The growth of this remarkable plant is so exceedingly slow as to be almost or quite imperceptible. The Mexicans, who call it maguey, gather it extensively, cutting off the leaves near their starting point, leaving a head of the size of a large cabbage. When a sufficient quantity has been procured, a very primitive oven, or big hole in the ground, is constructed, and the gathered heads are roasted, when they assume a brownish hue and are very palatable, the taste of molasses being predominant. In this shape they serve as food. About ten years ago this preparation of maguey is known to have saved a whole garrison in this Territory from scurvy. The smallest part, however, is thus consumed: the natives construct with raw hides strung by the four corners a kind of fermenting bag or tub, wherein the roasted heads in a few days commence to fall to pieces, and gradually form a thick, pulpy mass, which, after having sufficiently fermented, is distilled once or twice, and produces the ardent liquor known to commerce under the name of "mescal," sold here and in Sonora at about three dollars per gallon.

A beautiful and useful flowering plant, which adorns with its lively green leaves and scarlet blossoms the hills and mesas of Arizona, is called ocotillo. It rises from the ground in a group of from ten to thirty almost straight poles, which gradually extend outward and attain a height of from eight to fifteen feet. In the month of April the small leaves begin to appear in clusters of five, and gradually cover up the whole stem, which seems to be enveloped in a covering of vivid green. Upon approaching nearer, however, and touching this pretty pole, one becomes painfully aware of the hidden, sharp thorns which underneath run along the whole length of the gray and green stem, on whose top a lovely flower of from six to eight inches in length, consisting of many scarlet blossoms, commences to display itself in April. Very good fences are made with the poles of this plant, and although set in the ground without root, they will continue green for years, never more, however, producing a flower if the tops are once cut off.

Besides the pine, oak, cottonwood, sycamore, ash and other trees, there grows in Arizona the so-called mesquite, invariably on good soil. Forests of it are found in the southern portions of the Territory. It attains a height of over thirty feet, with proportionate thickness; its wood makes excellent timber for wagon spokes, and as firewood is unsurpassed. The fruit, which is a kind of bean, and called by the natives péchita, is splendid feed for cattle, hogs, and horses. From this tree flows, in the summer months, in considerable quantities, a dark liquid which has all the properties of gum arabic, and when clarified cannot be distinguished from it. It answers for all the purposes the latter is used for, and with exactly the same effect. A small shrub, evidently belonging to the same family, grows at the foot of low hills, has a rather pretty, reddish, feathery and very odoriferous flower, but seems not to attain the size of even a small tree. Juniper, mountain mahogany, and ironwood may be found at rare intervals in the southern portion. In the northern portion pines are abundant and juniper more plenty. In the southern portion, especially in the Santa Ritas, the valleys of the Santa Cruz and Sonoita, low, broad oaks are seen everywhere. On the eastern slopes of the Santa Ritas the resinous pine is found, The palo verde, which bears a remote resemblance to the mesquite, is only mentioned because it has been lately somewhat flattered. It is the perfect personification of ugliness, ungainliness and uselessness. It cannot give shade, because it has no leaves, but branches out into minute prongs with lazy thorns. Its wood is too soft and spongy to be of any use when green, and as it rots and falls to pieces upon the first signs of decay, is never hauled home for firewood. To the dirty, greenish color of its smooth bark it is indebted for its name; its blossoms are yellow bunches of minute flowers, which turn into small round seeds, that soon drop off.

The hedeundilla is the bush or shrub which covers the as yet dry valleys and high mesas of Arizona to such an extent as to be met with at every step, from two to eight feet in height, more or less densely grown. When a branch is broken off, and its small leaves rubbed between the fingers, an unpleasant odor will remain on one's hand until wiped off, to which circumstance this plant is indebted for its non-complimentary name. When merely approached to the nose the bad odor is insignificant. It produces during May and June a rather pretty yellow blossom, which turns into seed, (a round, white, feathery ball) and is blown away. A most valuable gum is obtained from this plant for medicinal purposes. The different varieties of the flora cannot be as yet estimated, and will not be for some time, as there are many flowers and plants to be classified. The sunflower family seems to be the most numerous. There are very delicate varieties of this and other species. When the flora of Arizona is completely arranged, it will be found to be of great interest to all scientists, as well as attractive to the general reader.

Of grasses, the most important is the grama, which exists in altitudes of 4,000 to 7,000 feet, and are partial to granitic, rhyolitic and basaltic soils, avoiding those derived from limestone, clay, or sandstone. They are frequently accompanied by the mesquite grass. At higher altitudes other grasses occur. The growth of grass in bunches is characteristic, and results from the winds that sweep over a dry soil, carrying away its finer particles, leaving only the coarse ones. The grasses, therefore, mainly spread by their roots.

Among the medicinal plants and trees are two species of pectis, juniper, a species of poplar, and the creosote bush, stinkweed, etiontis (*larrea Mexicana*). The pectis is a small yellow composite, growing in cedar woods, possessing an intense odor of essence of lemon; its cultivation might therefore prove profitable. Another and larger species of pectis has a peculiar action on the salivary glands. Balsam gathered from the juniper, by boring a hole in the lower part of the trunk, is used in various urinary diseases, for which the following formula has been recommended: of balsam of juniper, 1 drachm; alcohol, 1 ounce; manna, 2 drachms; dose, two drops thrice daily. It is claimed to be far superior to Canada balsam; it is of strong aromatic odor, light yellow color, perfectly transparent, and imperfectly soluble in alcohol; it has also been found valuable in the preparation of varnish. The bark of the poplar is used by the Indians as a remedy for fever and ague; its febrifugal qualities are probably due to the salicin and populin detected in it by analysis. *Ephedra antisyphilitica* is used in the form of a decoction for venereal diseases. From analysis by Dr. Loew it is found that the mineral constituents of the air-dried leaves amount to 5.58 per cent; their aqueous extract has an acid reaction, and an astringent taste resembling that of tannin, which is present in the form of a glucosid peculiar to the plant, and named *ephedrin*; tartaric acid and pectin were also found; but Dr. Loew attributes to this *ephedrin* whatever medicinal virtues it may have, and in which the Mexicans have great faith. For bathing purposes in rheumatic affections an infusion of *larrea Mexicana* is made, and said to be of excellent service. It is probable that close investigations in Arizona by competent medical botanists would greatly enrich medical science in reference to practical results.

Among the peculiarly valuable plants indigenous to Arizona and New Mexico, but little, if at all known elsewhere, are the *yucca baccata* (amole or soap-weed); the opuntia, a species of cactus; the agave, maguey or mescal; the grass arundinaria, and the algarobia or mesquite tree. The *yucca baccata* and related species are conspicuous in the flora of these Territories. Their peculiar leaves are provided with strong fibers well suited for rope, cloths, strong paper, etc. The roots, especially those of the species named, are used by the Mexicans and Indians as a substitute for soap, to which it is superior for washing woolen goods and hair, which latter when washed with it remains soft and glossy for days without the use of oil, and flannel clothes are perfectly cleansed by its use without shrinking. Its cultivation elsewhere might repay some enterprising person, as soap is believed to be deleterious to the hair, and the use of amole might prevent, and possibly cure, baldness. The froth produced by shaking the pounded soap with water resembles the form of soap. The root is cylindrical, two or three inches thick, branching, covered with a brown, brittle bark. The taste is said to be first sweet and then bitter and scratching. Dr. Loew, on analysis, found in it gum, grape sugar, cane sugar and saponin, to which latter principle he attributes its cleansing property. Saponin is also contained in agrostema githago, silena inflata, polygala senega, and other plants. The fruit of the opuntia contains pectin, grape sugar and tartaric acid; it is liked by Indians and bears. Arundinaria is described by Dr. Loew as "a grass ten to fourteen feet in height, well suited for paper making; a specimen of paper pulp was prepared from this fiber; it could easily be bleached by the application of a diluted solution of permanganate of potassa and sulphurous acid.

The plant of many designations, but more commonly known as mescal or maguey, has been previously described in this chapter under the name of the century plant or American aloe; but some additional details concerning this remarkable production may be of interest. In roasting it, after the edible portion is deposited in the ovens, (some of which are five feet in diameter) it is covered up with green leaves and grass, which in turn are overlaid with earth, and a steady fire is kept burning on top for a whole day. After allowing the mass to remain in this impromptu oven for three or four days, it is unearthed, prepared and eaten with great zest. It has a sweetish taste, not unlike the beet, but is not so tender, and possesses remarkable anti-scorbutic properties. Dr. Loew determined to get to the bottom of the subject, and proceeded as follows: "On trying the experiment of roasting the mescal myself, I was somewhat surprised by the thorough change that took place, and endeavored in vain to trace such a behavior to a known substance. We are aware that starch will yield sugar on being boiled with diluted sulphuric or muriatic acid; or also on being digested at 60 deg. with diastase. We know, also, that there are many glucosids that are split up, on treatment with mineral acids, into sugar and various other compounds. But with mescal the case is different, the sugar being formed without aid from mineral acids. There is no starch present in the plant; iodine does not reveal even a trace of it; neither is there present any isomer of starch, as inulin or lichenin. I was therefore led to the conclusion that we have either a new isomer of starch, or a new glucosid before us, and took a sufficient amount of the raw, dried material for investigation. If the finely-pulverized mescal be treated with alcohol to remove the trace of adhering sugar, the substance, upon boiling with water for a few minutes, yields grape sugar in abundance; this also takes place on treatment with a large quantity of cold water, and it appears to be an impossibility to separate the new substance from the cellular tissue without simultaneous formation of grape sugar; all attempts to this end were in vain. If the substance was a glucosid, another product besides grape sugar would be formed in the decomposition; and if this product could be isolated, the nature of the original compound in the mescal could be revealed, inasmuch as it represents a glucosid of this secondary product. Such a substance was found; it is contained in solution, together with sugar, when mescal is boiled with water; it yields a precipitate with neutral acetate of lead. This precipitate, after being well washed, was decomposed with sulphureted hydrogen, and the filtrate from the sulphide of lead evaporated. Thus an acid was obtained of an agreeable taste, easily soluble in alcohol and water. A close examination proved it to be citric acid, easily recognized by the peculiar behavior of the lime-salt, which is more soluble in cold than in hot water. Oxalic, succinic, malic, aconitic, and fumaric acids were absent; tartaric acid was present in small quantities. The nature of the original substance is thus revealed, and proves to be a glucosid of citric acid—a compound heretofore neither found in nature nor prepared artificially in the laboratory. This glucosid forms an exception to the usual behavior of this class of bodies, as water alone can bring about its decomposition into grape sugar and citric acid. The rational name for this combination is citro-glucosid." But we have not done with this remarkable plant, which seems to have been almost as valuable to the Apaches as the cocoa nut is to the South Sea islanders. A fiber is often obtained from its leaves from which they make lariats. The stem when dead and dry is laid over the rafters of houses, on which is laid the adobe for the roofs. The pith which it contains quenches thirst by sucking from the cut end, and the Indians chew it for the same purpose. Travelers should make especial note of this. The pith is of an insipid sweetness, palatable at first but soon becoming repulsive. It does not appear that any attempt has been made to utilize the large amount of saccharine matter which it contains.

The *arbor de hierro*, or iron-wood, (*olneya tesota*) is of much local value, and may become a commercial wood. Three species or varieties of the mesquite tree (which is related to the acacia and locust) occur in Arizona. The Mexican name is algarobia, which is sometimes used as its scientific name; the latter, however, is *prosopis*. It belongs to the mimosa family; its foliage is similar to that of the locust, but more delicate and sparse. Its wood is available for a great variety of purposes; posts in use for fifty years are still sound, and for railroad ties it must become of great value; it is fine-grained, and susceptible of a high polish. The *prosopis glandulosa* thrives in hot, dry places in the valleys, degenerates on the mesas, and is rare in the steeper slopes; the tree has a spreading habit, the limbs often reaching the ground, and is rarely more than thirty feet high and twelve inches in diameter. The wood, when young and thrifty, resembles in grain, texture, and durability the black locust; when old it is hard and brittle. On account of its hardness the dry branches are best prepared for fuel by the use of a sledge-hammer, from which has arisen the saying that in Arizona "we chop wood with a sledge-hammer, and cut hay with a hoe," which is literally true. The charcoal from the wood is unsurpassed for metallurgical and smelting purposes. The fruit, consisting of eight to twelve beans in a long, sweet, pulpy pod, like that of the carob (or St. John's bread) of the old world, is a valuable food for animals, and much prized by the Indians as food for themselves, being gathered in the fall, made into meal and used as porridge. Dr. Loew reports them to contain as much as 30 per cent. of grape sugar. The Camanches prepare therefrom an alcoholic beverage. In the Santa Cruz region two varieties are distinguished by the size of the pods, the larger being four to six inches in length, and the smaller, known as the "screw bean," from its screw-shaped pods, two to four inches. The larger kinds, growing in the valleys of Santa Cruz and of the Rillito, are unsurpassed for fuel, and make excellent lumber for some purposes, particularly for wagons. On the mesa these trees are very small, stunted, and almost leafless, more like a shrub than a tree, yet having the most stupendous roots, which, both dead and green, make most excellent fire-wood and a natural charcoal. It is stated that twelve feet square around one of these apparently insignificant bushes will sometimes yield a cord of firewood by digging. This characteristic of excessive rooting is also conspicuous in the locust. Its altitude does not exceed 4,500 feet, and the large kind is rarely found north of the Gila. Dr. Loew says: "The mesquite, cactus, and yucca are the representatives of a hot and dry climate. It is shown by the structure of these plants that it is necessary they should by every means prevent the loss of water by evaporation from their surface. The leaves are either very small, (as in mesquite, stinkweed and greasewood) or they are covered with a thick, dense layer, (as in yucca, agave) or they have no leaves proper, the functions of these being performed either by the trunk, as in the cactus, or by the branches, as in the ephedra. A further peculiarity is the large amount of mineral matter they have accumulated, which yields protection during long drought." For the scientist, the artist, and the utilitarian (and each of us should be all of these, more or less) the flora of Arizona is seldom excelled in interest for the singularity of its combinations, (which suggest another planet or another geological age) for the beauty of some forms and the eccentricity of others, and for the various uses of life.

CHAPTER XV.

THE INDIAN TRIBES.

Their History and Peculiarities. Governor Safford's Account. The Yumas, Cocopahs, and Maricopas—Their Divisions and Wars. The Colorado River Reservation; Agricultural Habits and Capacity. The Pimas and Papagoes, Moquis, Apaches, Mojaves, and Yumas. Small Pah-Ute Bands Cultivating the Soil. Area of Reservations, Habits, Morality, etc. Homes of the Moquis, etc.

The history and peculiarities of the various Indian tribes in Arizona, together with the details and results of the policies pursued (for they are many) towards them since 1858, would of itself constitute an interesting volume. But the limits of the present work do not permit of more than a brief summary of the present numbers, locations and pursuits, with a glance at the history, language and religion of each tribe. From the accounts of Father Garcia, who accompanied an expedition in 1774, it appears that the tribes on the Gila and lower Colorado, including the Yumas, Cocopahs, Pimas, Maricopas and Papagoes, then numbered over 25,000; they do not now much exceed 10,000. The tribes now inhabiting the Colorado river below the Great Bend are, commencing at its mouth, the Cocopahs, Yumas, Chemehuevis, Mojaves, and Pah-Utes. The Hualapais are in the adjacent mountains of Mojave county. The following is selected from a recent article by Governor Safford:

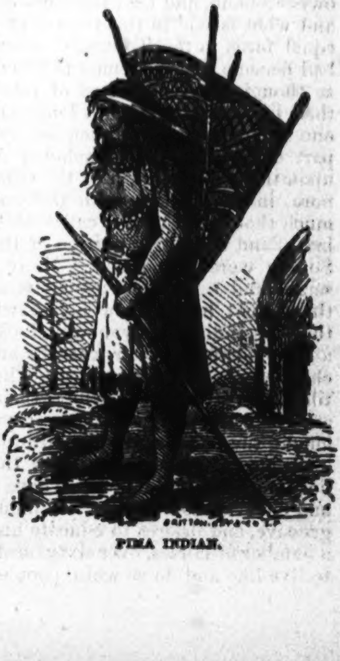
"There is probably no portion of our domain where such a variety of Indians live, speaking so many different dialects, as in Arizona. The Yumas and Maricopas speak a similar language, and at one time belonged to the same tribe. The Hualapais and Apache-Mojaves speak a similar language, and were at one time undoubtedly of the same tribe. The Pah-Utes, Savints and Supies all speak different dialects. The Aravaipa-Apaches speak a dialect different from all the other Apaches or Indian tribes in the Territory. The Coyoteros, Chiricahuas and Tonto-Apaches speak a similar language, and the Pimas and Papagoes speak a similar language, but entirely different from that of all the other tribes. The Yumas and Mojaves have a reservation on the Colorado river above La Paz. They were once powerful, ferocious and warlike. But twenty years ago several sanguinary engagements with our troops, the most notable of which occurred near Fort Mojave, convinced them that the pale faces were too numerous and too well equipped and skilled in the use of arms to longer contend against them, and a peace was agreed to, which has ever since endured. These Indians subsist upon fish, doing some work for the whites and raising some corn, wheat and vegetables, which they plant after the Colorado overflows the bottom lands. Some seasons the river does not overflow, when their supplies are cut short and much suffering ensues. They have a few horses, and some very good ones, which they prize very highly, and cannot be induced to part with, unless intoxicated. On their reservation are good agency buildings, and an agent is placed in charge, but is an agent only in name, as the Indians go and come at will. Sometimes, for brief periods, when they are out of food they are fed at the agency; but generally it is a question with them of "root hog or die," which is proper enough, for with the least industry and economy they could raise all they need. They excel in their physical construction; are tall, straight and well proportioned; they are capable of great endurance, and in traveling are almost as fleet as the wind. They have been of great service in sending messages up and down the river, generally traveling a hundred miles, and sometimes more, on foot in a day. When traveling on expeditions of this kind they carry with them a wooden ball, which they catch on the toes and throw with the foot as far in advance as they can, then follow upon the run, and repeat the same process until the journey is ended. The precise object of throwing this ball in advance I do not know, except that it keeps up an excitement and stimulates their speed.

"The Apache-Mojaves inhabited a section of country east of the Colorado; were first placed under the control of the military at Camp Date Creek, afterwards removed to the Verde, and thence removed to the San Carlos, where they remain at the present time. They were in open hostility to the whites until about five years ago, and committed most of their depredations about Wickenburg, Camp Date Creek, and on the roads leading from Wickenburg to Prescott, and from Wickenburg to the Colorado river."

"The Hualapais, or Wallapais, as it is often, but incorrectly, spelled, live in the mountains east of Mojave. They were a very brave and warlike people, as the graves that mark the places where most all of the early settlers rest unmistakably testify. The road from Hardyville to Prescott is lined with graves of men who fell at their hands, and the early miners of Mojave county were waylaid while prospecting, and killed at their cabins, shafts and tunnels, until for a long time the mines were practically abandoned. But they too found their numbers decreasing; and becoming weary of the constant danger of being attacked, sued for peace, were fed at Camp Beale Springs for a time, and afterwards were moved to the Colorado river and placed with the Mojaves. The heat of the river bottom did not agree with them, and the debauched condition of the Mojaves was a source of annoyance, as well as an example to the women and young that would soon destroy the sacred marriage relations in their own tribe. In vain they begged to be allowed to return to their own mountain home. They pleaded that they had assisted the whites in conquering hostile Indians, and if allowed to go back they would, if necessary, become self-supporting. Not obtaining permission, they left in a body, and as soon as they reached their old haunts they raised the white flag, and protested that they had come back to live in peace; that they would respect the rights and property of others, and by industry and the chase they felt sure they could make a living; that they knew if war was forced upon them it was only a question of time when they would be exterminated, but that, rather than return to the reservation, they would accept the alternative. The white people inhabiting their country generally sympathized with them, and desired that they should be given a chance. About three years have passed and they have quietly lived there, have been self-sustaining, peaceable, and have generally observed the rights of others' property. They occasionally enlist as scouts against hostile Indians, and are recognized as true and faithful. Wallapai Charley, who was taken prisoner many years ago and sent to Alcatraz, still lives among them. He speaks good English and is naturally very bright, but civilization and a knowledge of the English language have not improved his morals nor elevated his integrity. He knows all the subtle arts of gambling, and has used his knowledge among his associates to such effect that his people consider his tongue forked, and he has but little influence with them. Sherum is a brother of Charley; he was their great war chief, and is the present chief of the tribe. He is a man of firmness and courage, and is respected by both Indians and whites. It may be truly said of him that he was first in war, and is now first in peace.

"The Pah-Utes and Savints are not numerous, and they live on both sides of the Colorado cañon. They are quite inferior Indians, have but little property, and much resemble the Digger Indians of California, and make a livelihood in a similar manner. The Supies live above them, on what is called Cataract creek, a stream that rises in Bill Williams mountains, near Prescott, and empties into the Colorado cañon. This band consists of about 350 men, women and children, and considering their location and habits, are among the most remarkable in Arizona. Cataract creek, where they live, has cut itself down through a sandstone formation, until the walls rise perpendicularly on either side from two to four thousand feet. The valley below is from one-fourth to one-half mile wide, through which runs a beautiful clear stream of water, and the land is as rich and productive as can be found anywhere on the face of the globe. While the cold blast of winter sweeps over the mountains above, the valley below is a fairy summer land the year through. There are but two points where the valley can be reached, and these places seem to have been made by nature, as a strata of softer material, by the wear of time, has worn away on the side of these perpendicular cliffs from the summit of the mountain to the valley, wide enough for a trail. But it requires a steady nerve and a clear head to pass over these trails. As you start down, the cliff rises perpendicularly above but a few feet, but below you look down three thousand feet into what appears to be the last jumping-off place. The trail is from four to eight feet wide, and by constant use for a long time in many places is worn quite deep into the rock. Horses and mules that have never passed over the trail do so without fear, and without apparent knowledge of the fearful chasm that lies below them; there are few men who can bear to look upon the giddy sight, and some have to be fastened upon their horses and blindfolded in order to make the descent. The Indians say that some of the falls between where they live and the Colorado cañon are grand beyond description. Nestled in this deep and beautiful valley this little band of Supies live. They have orchards of peach trees, and raise an abundance; they also raise all the grain and vegetables they can consume. They exchange with the Moqui buckskins for blankets, and have always a large supply of blankets on hand to trade to the Hualapais and other Indians, who come to trade with them. They are the medium through which the various tribes make an exchange of goods and wares, and charging a little profit on each exchange has made them quite well off, for Indians, and they may well be called the merchant princes of Arizona. They have never been known to travel through the settlements of Arizona, and yet they have a good knowledge of the geography of the country, and the location of the towns and settlements in the Territory. Very few whites have ever seen these Indians, or this remarkably secluded valley. Those that have been there were kindly treated, and furnished with blankets and food. They are communicative upon nearly all subjects, and dispense their hospitalities with ease and grace, but when questioned upon the subject of mines, they at once reply that they have food and clothing for strangers, and they can come and remain with them as long as they please, but that the discovery of mines would bring people that would drive them from their home, and therefore they do not like to talk upon the subject, nor will they impart any information, if they have any.

"The Pimas have a reservation on the Gila river. They have a good many horses and cattle, and raise enough grain to subsist on and considerable for sale. They have always been at peace with the whites, but are much given to stealing. The young men are indolent and quite dissipated, and in morals and good conduct the tribe is improving the wrong way. A missionary has been with them for a number of years, and has faithfully labored for their good, but he has not made a single convert to the Christian faith, and slow progress has been made in educating the children. The Papagoes have a reservation on the Santa Cruz river, nine miles from Tucson, but the larger por-



PIMA INDIAN.

tion of the tribe live in a dry region of country west of the reservation, and their settlements extend some distance into Sonora. They are self-sustaining, and a quiet, peaceable, well-disposed people. There are no Indians on the continent that have been so long exposed to civilization and Christian influences that have maintained so good a state of morals.

"The Aravaipa branch of the Apaches lived north of the Gila river. The Tontos lived west and north of them, and the Coyoteros lived east. They were once a powerful tribe, are very fleet in action and keen in intellect. They formerly lived almost wholly by theft, and for their support laid the country under contribution from the Gila south far into Mexico, and east to the San Pedro river. No Indians on the continent better knew the art of stealthily surprising a foe, of so making their attacks as to win victory or make a safe retreat, of concealing their plans and movements, or of misleading their foes. So softly and slyly they approached the coveted object they desired to steal, that they could almost take a halter from the owner's hand, and lead the horse away without his knowledge; and what is said in this respect of the Aravaipas applies with equal force to the Tontos, Coyoteros and Chiricahuas. They had become so accustomed to this mode of living that it seemed as though the excitement of raiding was a necessary part of their life, and they fought long and desperately. They had at one time and another taken nearly every town in the northern part of Sonora, which included Arizona. They had foraged upon the country south of the Gila, including Arizona and Sonora, in conjunction with the Coyoteros and Chiricahuas so much that but very few cattle and horses were raised in Arizona, and the larger portion of the grazing lands in northern Sonora were abandoned. Many women and children were seized and taken into captivity, some of whom remain with them still; having now no knowledge of home and friends, they are Indians in sympathy, looks and actions. After losing a large portion of their warriors and many of their women and children, they sued for peace. They made two subsequent hostile demonstrations, in which their worst leaders were killed, and they now live on the reservation at San Carlos, and are among the truest and most faithful of our reservation Indians. They furnish a large portion of the Indian scouts used against hostile or renegade Indians, have acquired considerable stock, and cultivate some land. Eskimingen, their chief, is quite progressive, and desires to educate his children. He has acquired a number of horses, over sixty head of cattle, and says he wants to live like and do as white people do.

"The Coyoteros lived in the White mountains, and are similar in all respects to the Aravaipas. They have been moved to the San Carlos much against their will, and so far have made but little progress in accumulating property or cultivating the soil. The Tontos were among the last to surrender, and before they did so most of the tribe were killed. They are inferior, physically and mentally, to the other branches of the Apaches; hence their name Tonto, which in Spanish means fool. They, too, live on the reservation at the San Carlos. The Chiricahuas lived mostly in the Chiricahua and Dragoon mountains, and raided from the San Pedro to the Rio Grande and south far into Sonora and Chihuahua. This tribe was made famous by being controlled by the celebrated Cochise, who was the most widely known and the most dreaded of all the Apache Indians. From his standpoint, he believed that he had suffered great wrongs, and most terribly did he revenge them, as the bleached bones and graves thickly scattered over the country will show. During twelve years Cochise and his band carried on the work of death and torture in Arizona, with scarcely a reverse on their part. And when they finally made peace they were coaxed on the reservation and given their own terms. Cochise, at this time, had become old and in ill health; he appeared to be satisfied with the revenge he had obtained from the Americans, and desired to, and finally did, die about three years ago at peace with the people of Arizona. About a year and a half ago these Indians were moved to the San Carlos reservation, except a small portion under a sub-chief named Pionsenay, numbering about thirty warriors, who refused to go, and have since been at hostility with the whites, and have committed many murders in southern Arizona. Last spring this band was reinforced by the Warm Springs Indians in New Mexico, but shortly after that the Warm Springs Indians were moved to the San Carlos. A few weeks ago these left the reservation, but most of them have since surrendered. There are probably about fifty able bodied Indians in hostility to the whites. It is supposed that they have recently taken their families across the line into Sonora, and until they are subdued, they will give more or less trouble in southern Arizona.

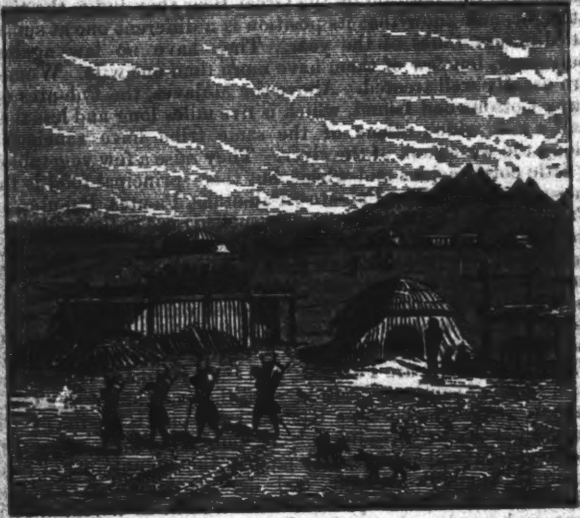
"All the Indians of Arizona are spiritualists. They believe that the spirits of the departed hover around and have knowledge of everything that transpires here. They also believe in witches, and many a poor victim is annually sacrificed for this diabolical crime. They have great faith in their doctors or medicine men, who by songs and various sleight of hand manœuvres are supposed to be in league with the good medicine spirit above. Their medicine men are paid well for their services, but if ill success follows their practice, they are killed. The Indian is, in letter and spirit, the head of the house. His commands must be obeyed, and he has a perfect right to do as he pleases with his wife—she is his property, and in nothing are they so jealous of their rights; if they please, they can indulge in the luxury of whipping their wives, and if they kill them it is no one's business except the husband's, who is the owner. Still the women seem to be satisfied, and are zealous for their cause in war, and cruel and unrelenting to captives taken in battle, and seem as hostile to innovations being made in their customs as the males."

The Coco-Maricopas are represented, in a map contained in Venega's History of California, published in Madrid in 1758, (also in a Spanish map of 1777, reproduced in this volume, Chap. II) as occupying the country south of the river Gila for 150 miles in length from its mouth upwards, and are mentioned in the body of the work as having entertained friendly relations with Father Kino about the year 1700. These people then consisted of three tribes: the Yumas, the Cocopahs, and the Maricopas. The Cocopahs afterwards seceded peaceably; the Maricopas then attempted to do the same, but were attacked by the Yumas, aided by the Cocopahs, and forced up the Colorado as far as the Gila, where they turned eastward, and finally found an asylum with the Pimas. In 1826 Kit Carson met the Cocopahs at the mouth of the Colorado. Subsequently they were visited by a Dr. Anderson. In 1872 General Howard reported them as friendly, quick to learn, miserably poor, and much diseased and debased (as are the Yumas and some of the Mojaves) "by the fearful crime that so often precedes and defeats our civilization." The Cocopahs now number about 200. The name Yuma signifies "Son of the River." They, as well as the Mojaves, are tall, erect, and well-proportioned, with large eyes, usually shaded by long lashes.

The Colorado River Indian Reservation was established under Act of Congress approved March 3rd, 1865, and consists of 128,000 acres, bordering on the river, and commencing between Ehrenberg and La Paz. The Indians residing on it are principally Mojaves, to the number of 900, and are said to be sober and diligent workers. The number of Mojaves in the river valley, not on the reservation, from Fort Mojave to the Needles, is about 600, all of them self-supporting. They are somewhat intermixed in location with about 500 Chemehuevis, both tribes cultivating small patches of ground, raising vegetables, melons, corn, and wheat. They perform some labor about the landings at Ehrenberg, Fort Mojave, and Hardyville. They have been but seldom troublesome to the whites, and some claim that in the few instances to the contrary the whites were the aggressors.

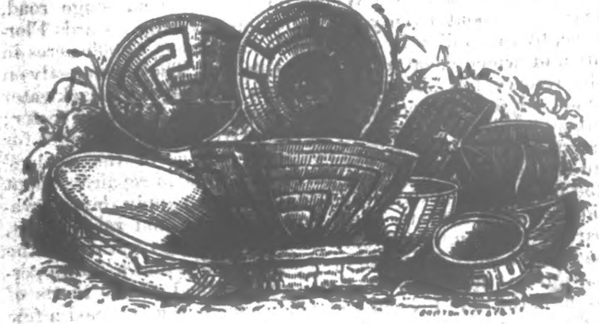
The Mongolian cast of features is more marked with the Pah-utes than with the Mojaves. The latter have names for the constellations; for some even the names of animals. According to the position of the Great Bear they judge the time at night, and know that its position is a different one at sunset at different times of the year. They have no law against polygamy, but few of them have more than one wife. Women are usually well treated. Above the Mojaves, the Pah-utes occupy Cottonwood Island, which is five miles long and less than half a mile wide; others of the same tribe have rancherias along the west bank of the river. They raise a few vegetables, a little corn, melons and wheat, but their principal food is the mesquite bean. The Pah-utes, Pah-utahs, Pa-utes, Pai-utes, or Payutes, (as the name is variously spelled) are entirely distinct from the Pi-utes of Mono and Inyo counties, California, in language and otherwise, though from the similarity of names and carelessness of some writers, it is not always practicable to make the discrimination. The Pah-utes constituted the main stock of the Shoshones. Those on the Colorado river came mostly from the Mojave river, California, some ten years ago. The Chemehuevis are Pah-utes, and their language is identical with those of southern Nevada. On the east side of the Colorado, near the line between Utah and Arizona, is a tribe of *Pi*-utes called the Kwai-an-ti-kwok-ets, numbering forty-seven persons. The U-in-ka-rets dwell among the mountains of that name in northern Arizona, and number about sixty. The Sheav-wits inhabit the plateau of that name in northern Arizona, and number about 180. These three tribes are probably all *Pi*-utes. The Hualapais now inhabit in a wandering way the greater part of the mountain region of Mojave county and the western edge of Yavapai, and are said to number only about 600, living by hunting, gathering nuts, roots, and berries, etc. They are a distinct tribe from all others in the Territory; they are small, dark and ill-formed.

The Maricopas (mentioned early in this chapter on the authority of a tradition as seceding from the Yumas, and then pursued by them and the Cocopahs up the Gila) on their arrival at Gila Bend about the middle of the eighteenth century, allied themselves with the Pimas, who parcelled out to them land for their occupation on condition that the new-comers should forever renounce their warlike and hunting propensities and devote themselves to tillage, which they did. They were left free as to laws, religion, etc. In this manner the two tribes have continued together for a hundred and twenty-five years; yet although many of them have intermarried, and their villages are never more than two miles apart, and in some cases not more than four hundred yards, it is difficult for them to converse with each other unless through an interpreter. Their laws, religion, manners, ceremonies and language remain quite as distinct as on the day they sought the Pima alliance, to the terms of which both have strictly adhered; as was forcibly shown when the Yumas, in 1857, concluded to revive the old feud by attacking the Maricopas, in consequence of which the attacking party was almost annihilated by the Pimas coming to the defence of their allies. The Maricopas now number about 400.



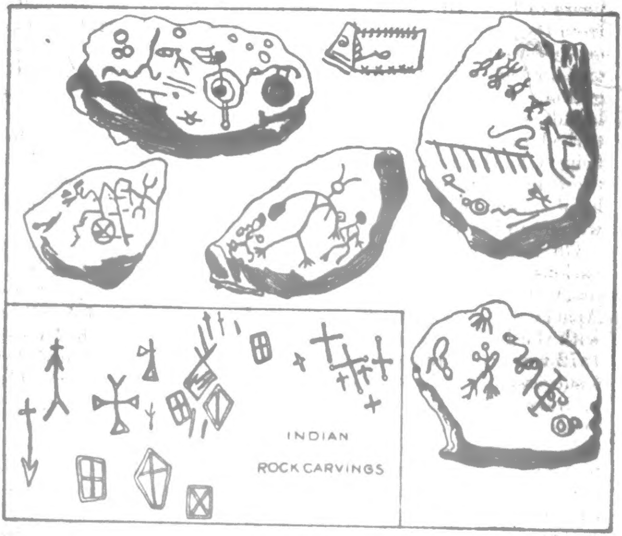
PIMA VILLAGE.

The Pimas have traditions that many centuries ago their forefathers were driven from their native land, and sought an asylum to the northward, passing through Sonora and settling in their present locations. They number, with the Maricopas, 4,216. When first found by the Spaniards, three centuries ago, they resided in settled villages, which they still occupy, cultivated the soil, and knew how to weave cotton and other fabrics. Their coarse hair grows to a great length and thickness. Their dwellings are generally dome-shaped huts, five to seven feet in height, and twenty to fifty feet in diameter, based on stakes, cross-poles wattled with willows, reeds or straw, and the whole covered with mud. Outside is an open shed, where they prepare their food. Adobes are seen occasionally. In summer they build light sheds of twigs in their corn-fields. Their land is held in common, but each family cultivates its designated portion and has a granary. The reservation commences near Maricopa Wells, on the overland stage road, extending about twenty-five miles on the Gila towards Florence, by four miles in width, and comprising 64,000 acres in area, of which 6,000 to 9,000 are tillable. They are mostly on the reserve, but about 200 families live on the Blackwater lands, adjacent, where they find good land and more water; others reside in the vicinity of Salt river, obtaining water for irrigating purposes from the spare water of the settlers' ditches, in return helping to keep the same in repair. About 150 miles of irrigating canals and ditches supply the reservation. They cultivate 7,300 acres of land, and raise wheat, barley, sorghum, beans, corn and melons, also gathering the mesquite bean. They use in general wooden plows, (more perhaps from necessity than choice) attached to the horns of oxen, in the old Mexican style; but have lately obtained a few light iron ploughs and American wagons. Notwithstanding such drawbacks they have, since the American occupation of the Territory, raised considerable surplus grain, from which the military in southern Arizona, as well as the mail stage company and others have been largely supplied. In 1876 they sold nearly two million pounds of wheat at three cents per pounds. They prepare and sort their wheat with the greatest care, and sell none that is not first-class. Their land for more than three centuries has produced large grain crops, without manure or renewal of any kind, yet seems not to diminish in productiveness. They own about 1,800 horses and 800 cattle. They have always proved themselves good warriors, and have been uniformly successful in resisting the incursions of the Apaches. In the "dark days" of Arizona their villages, with those of the Papagoes, often afforded the chief protection Americans had in the southern portion of the Territory. But for the Pimas and Maricopas there would have been for years no security for ordinary travel between Fort Yuma and Tucson. Their school is attended for nine months of the year by forty-four boys and twenty-two girls. Twenty-five Pimas and Maricopas can read and write. They are adverse to war, not because of incapacity, but from an attachment to peaceful pursuits. The chastity of the Pima women used to be proverbial. Twelve years ago prostitution was rare, and the loose women tolerated were almost wholly restricted to their own tribe. At that time the Pimas had but little intercourse with white men; but since then the evils of prostitution and the liquor traffic have greatly increased, and rival each other in their demoralizing effects.



PIMA AND PAPAGO MANUFACTURES.

The Papagoes have been partially civilized for centuries, and have never been much interfered with by the Spaniards. They number 6,000, and occupy 800 houses. They are widely scattered, being more pastoral than agricultural, and own 2,500 cattle, 45,000 horses, and 300 mules; yet they raised, in 1876, 140,000 pounds of wheat, and 28,000 pounds of corn. Their reserve contains 70,400 acres, of which 27,000 are tillable. It is a good one, but much infringed upon by Mexicans as to land, timber and water. Three-fourths of their subsistence is derived from civilized pursuits, and the remainder from hunting, etc. Unlike the Pimas, they cut their hair and wear hats, many of them adopting the habits and dress of the Mexicans. The evils of intemperance and immorality are scarcely found among them. The day school is maintained six months in the year, and is attended by 44 boys and 50 girls. Their agency was discontinued in March, 1876, and the Papagoes placed in charge of the agent for the Pimas and Maricopas. They formerly lived in the Papagueria country, and were of the same tribe as the Pimas, but became converts to Catholicism about the beginning of the seventeenth century, and still remain with that church. Their name signifies "baptized." They and the Moqui are the best Indians in the Territory.



PAINTED ROCKS.

The so-called Painted Rocks, of which a general view was given in Chapter VI, page 176, are situated about half way between the once nomadic tribes of the Colorado river and the village Indians of the Gila, and to the south of that river. As nearly as can be inferred from scanty and indefinite traditions, coupled with their situation, they were probably intended to commemorate some battle or other important event pertaining of inter-tribal relations. The characters do not all resemble those of the Aztecs or Toltecs, and are as yet utterly undeciphered. They are not painted, but engraved with some coarse instrument, by which the black and rather soft thin coating was scraped off. The stones on which the inscriptions are made are hard granite boulders, of entirely different character from the partially decomposed granite of which the small peak upon which they rest is constituted. Nor are the adjacent mountain ranges composed of any similar material. They have consequently been brought from very great distances by the energetic action of water in some form. This coating appears to be oxyd of manganese, similar to that on the rocks from the spring at Mineral Park, and those on the Mojave desert heretofore mentioned; but possesses peculiar magnetic properties which should be the subject of critical scientific investigation. A magnetic compass placed on the top of one of these boulders about vertically over its center of gravity is undisturbed in its polarity, which is, however, almost reversed by being placed near any of the ends. The cut herewith exhibits these hieroglyphics in some detail. Those on the lower left hand corner belong to the ancient house-building people, and were found in ruins in the valley of the Francisco river.

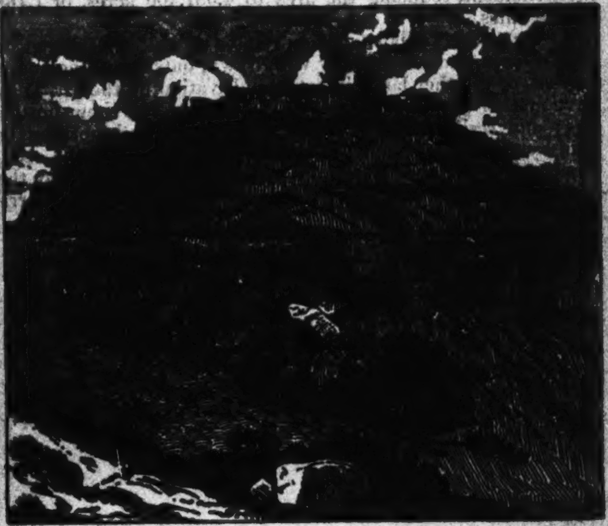
On the White Mountain Reservation are 4,459 Apaches of various tribes, viz: 1,512 Coyoteros, 1,051 Pinals and Arivaipas, 629 Tontos, 207 Chiricahuans, 352 Apache-Yumas, and 618 Apache-Mojaves; the two last-named are a mixture of Apaches with the Indians of the Colorado river. The Apaches until 1872 were continuously hostile. After General Crook had, by a succession of vigorous campaigns, impressed them as to his military abilities and resources, General Howard in the summer of that year visited Arizona as special commissioner, met Cochise, accompanied only by Mr. Jefferds, and an agreement was concluded, in pursuance of which Cochise ceased hostilities and used his influence with other Apaches to such effect that in October and November over a thousand Apaches had gathered in the Chiricuahua reserve established by General Howard in the south-eastern corner of the Territory. Jefferds was appointed agent at General Howard's request. On June 8th, 1874, Cochise died on the reservation. In the spring of 1876, some men were killed by Pionsenay, and others at a station, the matter originating in sales of whisky to the Indians. Taza, the son of Cochise, soon afterwards shot Pionsenay in the shoulder, and the youngest son of Cochise at the same time killed Skinya, the chief of the hostile party. Taza was then, and is now, chief of the Chiricahuas, and has been unswerving in his fidelity to the government. The result of the affair at the station, in connection with the proximity of the reservation to Sonora, which had a tendency to cause international difficulties, occasioned the agency to be broken up, and such of the Indians as could be got there were removed to the White Mountain Reservation, very unwillingly.

The agency at Camp Apache was established in the summer of 1872, and in June, 1873, 1,675 Indians were there located, who had planted 283 acres of corn, and felt much encouraged by their success. Next year they raised 300,000 pounds of corn, and 5,000 pounds of beans; they also cut and delivered 750 tons of hay to the post. In that spring thirty-seven of them made five miles of ditching, carrying enough water for 300 acres of land, at a cost of $1,650, at fifty cents per day for their labor, which by contract would have cost at least $3,000. In July, 1875, this agency was broken up, and the larger number of Indians removed to the vicinity of San Carlos. The agency at Camp Verde was also broken up, and the Indians thereon removed to the White Mountain Reservation, which is of ample area and productiveness, containing 2,528,000 acres, most of which is, and will continue to be, useless to the Indians, though well adapted to white settlement. In 1876, the Indians on this reservation had under cultivation 549 acres of land; they had cut 350 tons of hay, had raised 10,000 pounds of wheat, 200,000 pounds of corn, 28,000 pounds of barley, 18,000 pounds of beans, besides pumpkins, squashes, etc. They had 5,000 sheep, 537 horses, and some other stock. Their births in 1876 were eighty-six, against twenty-one deaths; 3,287 of them, however, had been under medical treatment that year. These statistics prove both their capacity for self-support and the adaptation of the soil and climate to the wants of man. The Coyoteros agency is thirty miles from Camp Thomas; and half way between them is the White mountain sub-agency, from which Mr. Ezra Hoag dispenses supplies to about 1,500 Indians, which he draws from the main agency at San Carlos.

The Navajo Reservation, by treaty of June 1st, 1868, is located in the north-east corner of Arizona and adjacent portion of New Mexico; it comprises an area of 5,200 square miles, or 3,328,000 acres, about half of which is pastoral land, but little adapted for cereals or vegetables. An addition of six miles in width at the south end would greatly increase the cultivatable portion. On this strip they have for several years raised corn and wheat. Although of the main branch of the

Apache people, they differ in their tribal organization, in the manufacture of superb blankets, and their agricultural and pastoral habits. Their stock consists of about 15,000 horses, 200 mules, and 1,000 cattle. They raise annually about 3,000,000 pounds of corn, and succeed well with pumpkins and melons. Peaches of good size and flavor are raised by them in the Cañon de Chelly. Their blankets are a perfect protection against rain, wonderfully warm, and sometimes command as high as $125 each. These, with sashes, leggings, etc., they sell to the amount of $20,000 annually. The wool for white yarn they obtain from their own sheep, estimated to number 400,000; and in addition to the wool used in the manufacture of blankets, they sold 200,000 pounds in 1876. The men are as expert with the needle as the women, and have often been seen, on getting the goods from the agent, to make their own shirts and pants, and to appear in less than half a day with an entire new suit. They number 5,852 males, and 6,106 females. Of the whole number, 3,500 are of mixed blood.

The Moqui occupy seven villages, or "pueblos," east of the Colorado-Chiquito and Painted Desert, on table-lands two to five hundred feet above the level of the surrounding country, and accessible only by steep paths and steps, easily defended. One of these plateaux is six miles in length by half a mile in width, and on it are four of their villages. The other three small plateaux have each a village. The houses are of stone, laid in mud mortar, two stories in height. The inhabitants of the village of Oraybe are of distinct origin and language from those of the other villages. They cultivate about three thousand acres of land, corn being the chief product. The Moqui peaches are of a superior quality, and constitute when dried an article of commerce between them and other tribes; they also raise apricots. They are very fond of potatoes, onions, turnips, etc. They draw no government rations. The lands in the immediate vicinity of their villages having become almost worn out by long cultivation, about thirty families were, in the spring of 1876, induced by the agent to plant crops in a fertile valley about fifteen miles distant, with very encouraging results. As there is no legal reservation, they are liable at any time to be reduced to abject poverty, by encroachments both of other Indians and whites. They must have some legal rights in this matter, as Judge Slough, of New Mexico, decided that the status of the Pueblos—a similar class in that Territory—was that of citizens. The Moqui are of small stature, the men averaging about five feet in height, and the women four feet. Their features are strongly marked and homely, with an expression generally bright and good-natured. The figure of the women is rotund, but their carriage graceful; the face full; pretty, intelligent features, and good teeth. The agent in 1875 reports that "polygamy is not tolerated among them; they are true to their marriage relations; venereal diseases are almost unknown. Any one that violates the established code of morals is ostracised. This is considered sufficient punishment for any crime." A manual-labor and boarding school has been established among them, with far more success in its results, as inferred from the agent's report, than similar efforts on the Pacific Coast generally exhibit.



MOQUI VILLAGE.

Colonel Hodge, in his recent work on Arizona, states that "the word Moqui means death, and was applied to them by other tribes at a time long since, when the small pox killed off large numbers of the tribe. Their original name was Ha-pe-ka."

Exclusive of the Navajoes, (who number about 9,000, half of their reservation being in New Mexico) the Indian population of Arizona is a little over 20,000. The legal reservations in Arizona aggregate 7,323,400 acres, or 11,443 square miles, exclusive of the land occupied by the Moquis and by the Indians on the Colorado river not on reservations. Inasmuch, however, as the Indians have all been removed from the Chiricahua Reservation of 2,736,000 acres, it will probably soon be open for settlement, reducing the area to 4,587,400 acres, or 7,168 square miles.

So far as the Indian question relates to white settlement, it may be regarded as virtually withdrawn, outside of the reservations, or of other lands in actual cultivation by them. They have neither the disposition nor the ability to renew hostilities; and residents have everything to lose and nothing to gain by any infringements upon the Indian lands, in the occupancy of which they would be protected, if necessary, by the military power, as well as by the public sentiment of the Territory.

CHAPTER XVI.

MISCELLANEOUS.

RAILROADS AND WAGON ROADS. THE VARIOUS LINES OF TRANSPORTATION; STAGE ROUTES; COST OF TRAVEL. FREIGHT EAST AND WEST. PRICE OF LABOR; SKILLED MECHANICS. POPULATION AND ITS GROWTH. TAXATION AND PROPERTY VALUATION. THE SCHOOLS. MEXICAN POPULATION. SEMI-ORIENTAL HABITS AND APPEARANCE. ADOBE HOUSES. LAKES, ETC.

It has been seen by the careful statements heretofore presented that but a small portion of our new territory equals Arizona in natural resources, when it is considered that to almost unsurpassed mineral wealth are added its agricultural and pastoral facilities, abundance (in some portions) of large timber, and a widely varied but generally healthy climate. Like many other good things, however, Arizona is still difficult to reach. The enterprise that conquered the heights and snows of the semi-arctic Sierras, has not been beaten by the depths and drought of the super-tropical Colorado Desert. Turning from the poetry to the prose of this subject, the reader will find the fares, etc., *via* the Southern Pacific Railroad and the Colorado river, fully set forth in the Appendix.

Leaving San Francisco by steamship, the route is *via* the port of Santa Monica, $14 cabin and $9 steerage; thence to Los Angeles by railroad for $1, and from Los Angeles to Yuma, $23 by railroad, or to Dos Palmas $13. The cost from San Francisco by this route will therefore be $38 to Yuma and $28 to Dos Palmas. From Colton to Yuma is $20, and to Dos Palmas $10. Ehrenberg is on the route to Prescott, Wickenburg, and the county of Yavapai generally; but passengers for Mojave county go higher up the river, to Aubrey or Hardyville. Those disposed to take a longer time at less expense can go by freight teams from Dos Palmas to Ehrenberg, and thence to the extensive country of which that point is the distributing center. The Southern Pacific Mail Stage line, of which Kerens & Mitchell are proprietors, claims to be the longest stage line in the United States, extending from Yuma to

Mesilla, N. M., there connecting with another stage line for Austin and other places in Texas. The company own 650 horses and 37 coaches and stages, employing 47 drivers and 104 stock-tenders. The fares on these lines will be found in the advertising pages of this volume. The remaining stage and other connections in the Territory will be found set forth in the Appendix.

For travel by wagon or horse, there are northern routes from Nevada and eastern California crossing the Colorado at Stone's Ferry, thence eighty miles to Mineral Park, forty of which are through the dreaded Death Valley, Detrital Valley or Forty-mile Desert, (as it is variously denominated) on which there is no water. From Mineral Park to Prescott the roads are easy. The Utah Southern Railroad has now reached about 100 miles south of Salt Lake, and is less than 500 miles from Prescott, to which place there are two or three wagon roads. From southern California there is a road by way of the Cajon pass, about twelve miles from San Bernardino, with stations for about 100 miles at frequent intervals, at which travellers are accommodated at reasonable rates. For the remainder of the distance through this Mojave desert to Hardyville, nearly 300 miles from San Bernardino, the only difficulty is want of water, which at one place appears to be absent for thirty-three miles. Approaching Arizona from the east, there are good roads with requisite facilities from the present terminus of the Denver and Rio Grande railroad, from Santa Fé, Albuquerque, Fort Wingate, etc., to Sunset Crossing, on the Colorado-Chiquito, and thence to Prescott; and on the south by Mesilla, New Mexico, on the Rio Grande, whence there is a stage route to Tucson, 350 miles distant.

With the subject of wagon routes is naturally connected that of freight. The routes of supply for Arizona, present and prospective, are more numerous than is generally supposed. The principal ones are four in number, viz: 1. That from San Francisco, or from New York and the east *via* San Francisco, by steamer and railroad, to Fort Yuma and Dos Palmas. At Dos Palmas, 631 miles from San Francisco, freight destined for the northern part of the Territory is sometimes transferred from the railroad to wagons, but is mainly shipped *via* Yuma, and thence by river steamers to Ehrenberg, Aubrey and Hardyville. 2. To Denver, *via* the Kansas Pacific, and thence by the Denver and Rio Grande Railroad to its southern terminus, near the line between New Mexico and Colorado; or by the Atchison, Topeka and Santa Fé, from Atchison to Pueblo, on the D. & R. G. R. R., and thence to the same terminus. 3. By steamboat and railroad, *via* Austin, Texas, thence by wagons. 4. By rail, *via* Salt Lake city, and the terminus of the Utah Southern Railroad. The first and second routes are in actual use; the third can be at any time made available; the fourth requires some expenditures on wagon roads, pending the slow but continuous advance of the railroad. According to Lieutenant Wheeler's reports, "it appears that the shortest possible distance in an air-line from Beaver to Prescott is 255 miles; that *via* the mouth of the Virgin river, Sacramento Valley, Beale's Springs, etc., (entirely a wagon-road) the distance is 429.98 miles. From the same point to Prescott, *via* the head of the Sevier, the mouth of Paria creek, Little Colorado river, etc., (wagon road, except for short distance in the immediate vicinity of the Little Colorado) the distance is 446.04 miles. By way of Saint George, Utah, the Grand Wash, Colorado crossing of the Expedition of 1871, (wagon road to the Colorado river and from Truxton Springs) the distance is 391.39 miles, which is shortened by a conjectural road *via* the edges of the Colorado plateau and Pahroach Springs by seventeen miles. By ascending the Little Colorado from a point at which it is reached by the Mormon wagon-road from the mouth of the Paria, to Sunset Crossing, where the regularly traveled road westward across the San Francisco plateau leaves that stream, it becomes practicable by well equipped parties, carrying forage, to be obtained while going from the north to the south from the lower Mormon settlements, and from Prescott outward to the north. Water is obtained at practicable, if not always convenient intervals. Grass is plentiful all along the plateau westward from the Little Colorado. The Moqui Indians, in their trading expeditions to Prescott, follow a trail from the Little Colorado at the above point, which leads *via* Crater lake, and it is stated that water exists somewhere on that trail between Crater lake and the Little Colorado. It is estimated that the distance from Salt Lake city to Prescott, *via* the Utah Southern Railroad, to such point as it is soon likely to reach in the valley of the Sevier, thence *via* Panquitch, mouth of the Paria, Little Colorado, Crater lake, etc., could be reduced to 648 miles, while *via* Beaver and mouth of the Virgin it would be 647.58 miles." This gives 548 miles of wagon transportation at this writing. No goods for Arizona are known, to be freighted over that road at present, except perhaps small amounts for the settlements on the Colorado-Chiquito; but as the railroad advances, this route will prove to be a formidable competitor. It is probable that even now goods could be laid down in Prescott, from Salt Lake city, at ten cents, and from the Atlantic or Pacific coasts at twelve to fourteen cents per pound. The road is being pushed forward to St. George, near the Arizona line, less than 200 miles from Prescott, and only 2,800 miles from New York.

In reference to mail communication, the principal routes have been tri-weekly, but from July 1st, 1878, they will be daily, or six times a week, from Yuma to Tucson, and from Prescott to Dos Palmas, the latter route being *via* Wickenburg and Ehrenberg. From Prescott to Santa Fe, *via* Verde, Sunset Crossing and Fort Wingate, the mail will be tri-weekly; also from Wickenburg by Phœnix, East Phœnix and Hayden's Ferry to Florence. The semi-weekly routes will be from Prescott, *via* Williamson's Valley, Mount Hope, Hackberry, Mineral Park and Hardyville, to Mojave City, 190 miles; from Ehrenberg, by Parker, Aubrey, McCracken Mine, Signal, Whitney, Free's Wash and Cerbat, to Mineral Park; from Wickenburg, by Walnut Grove, Bradshaw and Alexandra, to Prescott; from Hayden's Ferry to McDowell; and from Florence to Globe. The weekly routes will be from Mineral Park to St. Thomas, Nevada; from Tucson *via* Ostrich Mine to Sassabi Flat, seventy-five miles; from Tucson *via* Tubac to Monument, seventy-two miles; from Tubac *via* Crittenden to Graterville; from Tres Alamos by Camps Grant, Goodwin, Thomas and Safford, to Clifton; and from Clifton to Silver City, New Mexico.

The distance from Albuquerque, N. M., (towards which the Denver & Rio Grande Railroad is being pushed) is 460 miles. Freight is being delivered from the present terminus to Prescott for five cents per pound by oxen or eight cents by mules, with a prospect of material reduction in case of large business. The expenditure of a few thousand dollars on the Mogollon mountain for a distance of about thirty miles would, it is claimed, make it an excellent road for the whole distance to Fort Wingate, and that the market for wool would be better in the eastern cities than in San Francisco. Rates of freight from New York city to Fort Garland are now $4.27, $3.63, $2.99 and $2.31 per hundred pounds for first to fourth class goods, respectively; from Chicago, $3.52, $2.93, $2.39 and $1.86; from St. Louis, $3.32, $2.73, $2.29 and $1.81; from Kansas City or Leavenworth, $1.50 and $1.25. From Denver to El Moro is 60 cents per hundred pounds, and $72 for a car load of 16,000 pounds. Ore from El Moro to Kansas city is $6 per ton; copper, pig and bar, from Kansas city to Baltimore, 80 cents per hundred pounds. El Moro is on the east fork of the Denver & Rio Grande Railroad, and Fort Garland on the west fork; the latter being nearer to Prescott and divided from the former by the Sierra Madre range. The rates from and to Fort Garland are probably five per cent. higher than to El Moro, which is equally available for the southern part of the Territory with Fort Garland. The latter is in the San Luis valley, or park, 8,339 feet above the sea, and seven miles from the military post of that name. It is in the State of Colorado, but very near the line of New Mexico. From these stations to Mesilla, N. M., is about 850 miles, with no obstructions of any kind. From Mesilla to Tucson is 276 miles, over a road well provided with grass, wood, and water, having running streams at no great distance apart. From Mesilla to the Rio Miembres is 71 miles; thence to Valle del Saux, 72 miles; from there to San Pedro river, 80 miles; and thence to Tucson, 53 miles—being a total of 626 miles from Tucson to the present terminus. By using ox-teams and not feeding grain, the expenses of freighting by wagons is said to be reduced one-half; and three-quarters of a cent per pound per hundred miles is alleged to be remunerative, when there is freight both ways, in a country where grass and water are so abundant as on this route. If these estimates are correct, five cents per pound would pay the expense of freight from El Moro to Tucson, which, added to the railroad freights as above stated, would give 7¼ to 9¼ cents per pound as the cost from New York to Tucson, exclusive of small incidental charges.

For southern Arizona there is still another route available from the east. The Mesilla (N. M.) *Independent* states that first-class freight can be shipped from New York to Austin, Texas, in nine days at one cent per pound, and less for special rates. From Austin to Mesilla, less than six hundred miles and time less than thirty days, freight is estimated at four and a half cents by oxen. At one cent per 100 pounds, three cents more would bring it to Tucson, being eight and a half cents from New York to Tucson, exclusive of half a cent for commissions, etc. The Southern Pacific Railroad is, however, bidding well for this business. The rates from New York to San Francisco by railroad range from $1.25 to $6 currency per 100 pounds. From San Francisco to Ehrenberg, $3 coin per 100 pounds general merchandise, $2.50 for grain per 100 pounds, or $1.75 by the car load. From San Francisco to Yuma $1.60 to $2 per 100 pounds; grain $24 per ton. From Los Angeles to Yuma, general merchandise, $1.76 per 100 pounds; grain $17.50 per ton. From San Pedro or Santa Monica to Yuma, $1.82 per 100 pounds for merchandise. From Yuma to Ehrenberg $20 per ton by weight or measurement. From San Francisco to Santa Monica or San Pedro, the freight by steamer has been, by measurement, $5 per ton of forty cubic feet. By this route freight from New York to Prescott would appear to be about ten cents per pound, estimating four cents from New York to San Francisco, three cents from San Francisco to Ehrenberg, and three cents (188 miles) from Ehrenberg to Prescott. This seems to be from two to four cents per pound less than it could be done at present by the Utah route, and perhaps a fraction lower than practicable *via* the Denver & Rio Grande Railroad. From San Francisco to Tucson the total rate would probably average $7 for general merchandise, the expenses of hauling being greater west than east of Tucson, on a large part of the route. There are few people who have the remotest idea of the capacity of the freight wagons, with their twelve to twenty mules attached to two or three wagons, one being on the trail of the other. These teams are capable of carrying from 12,000 to 18,000 pounds. One man conducts the whole affair. Riding the near wheeler mule, he manages the eighteen mules with one line, attached to the near leader; and from his seat in the saddle, with a rope, he manipulates the brakes, and thus he conducts the train. The freighters have considerable pride about keeping up the appearance of their stock. Sometimes every mule will have a row of Russian bells strung up over his collar, and they travel over the country to the music. To fully realize the colossal size of one of these "land ships," one must observe an ordinary wagon beside it, then see the contrast.

Many persons coming from colder regions to southern California, Arizona, etc., erroneously suppose that warm clothing or coverings will no longer be necessary or desirable. As will be seen from the chapter on climate, Arizona is very much diversified as to temperature; and even in its warmer portions the difference between day and night is usually so great that two pairs of blankets can be utilized for a large portion of the year; overcoats are often desirable, and warm under-clothing is a necessity. All kinds of clothing, woolen goods, and notions bear high prices in Arizona, and are likely to do so for some years. In view of these considerations, persons coming to the Territory to reside should not dispose of any warm clothing or blankets they may possess; as, even if not needed in the particular place settled upon, such changes of locality of even short distances as business exigencies may render desirable, might involve a very great change in temperature, in view of the peculiarly diversified conformation of the surface.

It is by no means certain that Arizona is now a good place for the laborer without some capital. The cost of living, though much reduced, is still great as compared with older settlements. There are as yet few organized industries, and it is expensive to get there. Experienced and skillful mechanics get good wages when employed; but their chances for employment much depend upon their being on hand at the time and place where their services are needed. A man who is not only expert at his special trade, but is generally "handy," and has means enough to keep himself for a few months, could soon pay his way, and by watching opportunities place himself where his services would be in demand at a good price. These uncertainties being understood, and making liberal allowances for local variations, above and below, the following rates are now approximate for American labor:

Blacksmiths $3 to $4 per day and board; wagon makers, $4 to $6 per day, without board; masons and bricklayers, $5 to $7 per day without board; painters, $5 per day and board; carpenters, $4 to $6 without board; miners $2.50 to $3.50 without board, and in general $2 per day and board. The following rates are with board, viz: herders, $40 to $50 per month; farm hands, $30 to $40; cooks, $40 to $60; teamsters, $50 to $60; stage drivers, $50; hostlers on stage lines, $30 to $40. In the south white laborers, teamsters, herders, etc., are but little in demand, though skilled mechanics sometimes get higher wages. For common labor, Mexicans can be hired at less rates, as specified in the description of Tucson. Their labor, however, is open to objection, so that a steady, industrious, and reliable white man would probably secure a preference at higher compensation.

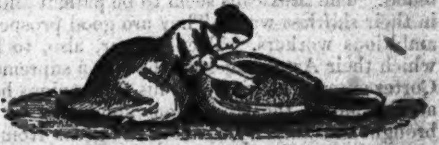
In population and wealth Arizona is rapidly advancing. By the census of 1876, the population of the various counties was as follows, viz: Yavapai, 13,738; Pima, 8,117; Maricopa, 3,702; Yuma, 2,212; Pinal, 1,600; Mojave, 822; giving a total of 30,191, besides about 25,000 Indians. The increase, however, is very rapid. The population of Yavapai county at the present time is not less than 15,000, some claiming as high as 20,000; and the towns alone in Mojave county now contain over 600. The taxable property of the Territory this year amounts to $1,800,000, an increase of $400,000 in one year. Assuming the population to have increased in about the same ratio, it would now be over 38,000. Yavapai county this year pays $60,000 for taxes; Prescott pays $7,000, besides licenses; Pima county pays $20,000 for taxes. In Yavapai county there are estimated to be 200,000 sheep, 20,000 cattle and 4,000 horses and mules.

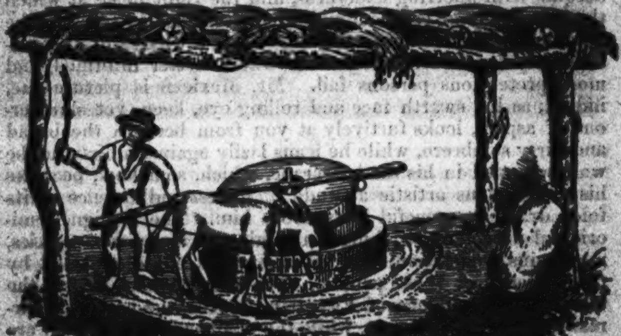
After long and energetic labor on the part of Governor Safford and others, a good common school system has been established in Arizona. Of 2,955 children in the Territory, according to the census of 1876, (1491 boys, 1464 girls) 1,157 have attended school, and 1,450 were able to read and write. The percentage of illiteracy among minors though large, owing to the recent introduction of efficient measures is rapidly decreasing, notwithstanding the drawbacks attendant on new and sparsely settled regions in this respect. A tax of thirty-five cents for every $100 of taxable property in each county is levied for school purposes, besides a general one of fifteen cents per $100 collected and paid into the State Treasury for educational purposes. The following table (incomplete as to Yavapai county) is an outline of the school statistics of Arizona:

COUNTIES.	No. of schools.	No. of pupils.	Average attendance.	Illiterate	Total children, 6 to 21.	No. of teachers	Agg. pay of teachers
Pima.....	5	206	161	570	1282	6	$600 00
Yuma....	3	126	94½	279	519	3	300 00
Pinal.....	1	102	69	157	249	1	140 00
Maricopa.	3	69	48	104	213	3	225 00
Mojave...	2	(?)46	(?)30	12	33	1	87 50
Yavapai..	..	(?)500	..	..	...	..	....

Schools among the Indians, except at the Moqui villages, have not proved very successful, perhaps in some cases from a deficiency in the appropriation. Governor Safford recommends that a few children should be selected from each tribe, taken to some convenient locality near the reservation to be instructed to read, write and speak our language, their parents to be allowed to visit them at stated times, they to be allowed to return to their people at vacations; and on attaining sufficient age, to become teachers of their own people, or learn some useful industry; the expenses to be defrayed from the appropriation for education. The presence of a considerable Mexican population in the southern half of Arizona adds to the peculiar conditions which prevail in material, as well as social affairs. The public school discussion has acquired a sharp character, owing to the church influence and polity; but at present the debate adds vigor to educational efforts, and creates a healthy rivalry between the public and the parochial schools.

In many respects the Mexicans are quite primitive in their habits. For instance, they still use as a plow a sharpened stick of wood fastened to a beam, which beam is tied to the horns of the cattle by means of thongs of rawhide, serving the purpose of a yoke. No iron ever enters into the construction of their carts—little clumsy vehicles, usually drawn by the patient *burro*, and made entirely of wood and rawhide, the wheels being sections of a stump of a tree. The sun-dried brick are literally made without straw. All grain is threshed in the field; nor do they "muzzle the ox that treadeth out the corn." Chairs and tables are not common articles of furniture in the poorer Mexican houses. The floor is a common settee. With them fingers were made before forks, and continue to be used as nature's substitute therefor. They eat largely of *tortillas*—unleavened bread; *chili*—red pepper; *frijoles*—or beans, and garlic. The tortillas are made of corn, which is first soaked in a weak lye, and then boiled until it is perfectly soft, when it is crushed at a *metate*, consisting of two flat stones, as seen in the engraving. The work is in all cases done by women. The other method of grinding is to be seen in the picture of the improved Mexican mill, whose revolutions of not over a score

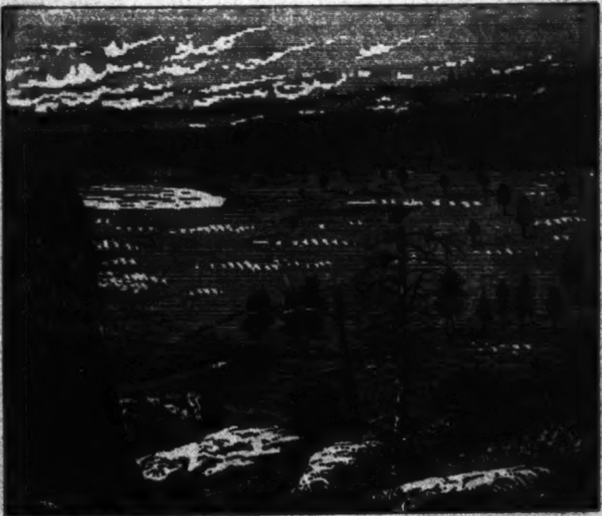

METATE.


HORSE MILL.

per hour, accomplished by the untiring patience of a much abused *bronko*, or *burro*, is not a remarkable piece of machinery as a product of 300 years of cogitation. After the corn is crushed at the *metate*, it is moulded into a kind of pancake, and baked on a heated iron or stone. Meat rarely forms any part of the ordinary Mexican *cuisine*.

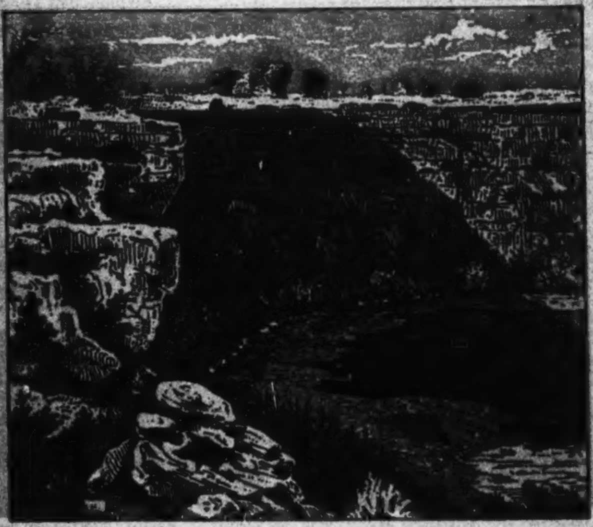
The adobe houses that are used throughout semi-tropical Arizona are not comely or inviting in aspect; but with the improvements as to light, ventilation, etc., which Americans have already introduced, they can be made exceedingly comfortable, and are, in fact, the character of buildings best adapted to the climate. The cost of adobes is about $10 per 1,000, and with construction, the cost will be about $40 per 1,000.

The Mexicans are largely mixed with Indians, and they have the broad, flat, red face of the Pimas or Papagoes far oftener than the dark, sallow, bronzed and rather narrow faces of the Mexican, who can boast truly of both Castilian and Aztec blood. The Mexicans seem to be patient and industrious, too, in their shiftless way. They are good prospectors, though not ambitious workers. They appear, also, to inherit a faculty which their Aztec ancestors had in a supreme degree. When Cortez entered Mexico with his companions he was struck with admiration at the stupendous aqueducts by which water was brought into the city, rivaling the great Roman works in their extent and skill of construction. Later conquerors have expressed the same admiration. The degenerate Mexican referred to is still a natural engineer. He can construct an acequia with unerring exactness, find the right place at which the water may be reached, and whereat sufficient fall may be obtained, without having the slightest knowledge of the reasons therefor—succeeding often where better informed and more pretentious persons fail. Mr. Mexican is picturesque, indeed, as his swarth face and rolling eye, keen, yet slumberous of aspect, looks furtively at you from beneath the broad and dirty sombrero, while he leans lazily against a dirty adobe wall, wrapped in his dirtier serape, which, somehow, becomes his unconscious artistic attitude of listless indifference as its folds drape in graceful lines about him. The foreign, semi-oriental aspect of all things in semi-tropical Arizona—skies, mountains, vegetation, arid mesa, etc.—is not diminished by the presence of these people. The water vessels recall the monumental evidence of Egyptian utensils, the patient "burros" are Syrian in aspect, while the manner in which oxen are yoked can be pithily and exactly described by a biblical quotation. The water carriers appear as if they had stepped from some Old Testament picture, and the asses, laden almost beyond their own size, are duplicated again and again in Egyptian scenes of this period, as well as in those of more ancient times. The Pimas add to the semi-oriental aspect of the scene. Here is one of them: A broad, reddish face, with antique mould of features, good-humored and smiling; a lithe, spare frame of middle stature, with bare red feet and legs partly uncovered; head crowned by a red turban, and form clad in a dirty white shirt and drawers, with a red sash about the waist—a semi-burnoose in style—made up an ensemble which it was easy to consider as a semi-civilized Bedouin of the desert waiting for backsheesh from some over-plundered traveler of our own stock. It was but a Pima, smiling good-naturedly at the passing traveler.



STONEMAN'S LAKE.

In lakes, Arizona is not a marked success as to size, though they are numerous in the northern and north-eastern parts of the Territory; some of them are called "wells," and the water is usually pure and fresh. One near Navajo Springs is known as Jacob's well. Apache lake is in the vicinity of the post of that name, near the north fork of the White mountain river. Reservoir lake is on the eastern base of the White mountains, and consists of a shallow basin floored and walled by lava. The water is shallow and weedy, its maximum area is about 65 acres. Robert Garside, of Kirkland valley, has had a boat built in Prescott to navigate the lakes on his ranch. Stoneman's lake, represented in the cut, is fifty-eight miles west of Sunset Crossing, on the Colorado-Chiquito, and thirty-one miles north-east of Camp Verde. Several lakes are found near Bill Williams mountain. The Montezuma well, fifty-five miles north-east of Prescott, twelve miles north of Camp Verde, and two miles east of Mr. Arnold's farm, is in a limestone formation, on a bare, rocky, and level mesa one hundred feet above the creek and seventy feet above the water, which is clear, pure, and about a hundred feet in depth. The opening to the well is circular and about six hundred feet across; its



MONTEZUMA WELL

inner walls are perpendicular. On the north-west side, midway between the water and the surface of the mesa, are three or four pre-historic cave dwellings, twelve to twenty feet frontage, and about the same depth. The eastern and south-eastern borders of the well are within thirty to one hundred feet of Beaver creek, from which it is separated by a rim of enclosing limestone rock, which was built up with stone buildings its whole width, and about one hundred feet in length; the walls of these old buildings yet remaining are twenty feet high in places. On the south-east side of the well is another old cave-dwelling near the surface of the water, which runs off under the cave into the creek, which never dries up. Broken pottery-ware is abundant in the immediate vicinity. Dykes of lava are on the flat, and the well itself is supposed to be the crater of an extinct volcano. There are many other features in the Territory worthy of mention, but the limits of this chapter and volume compel omission of reference.

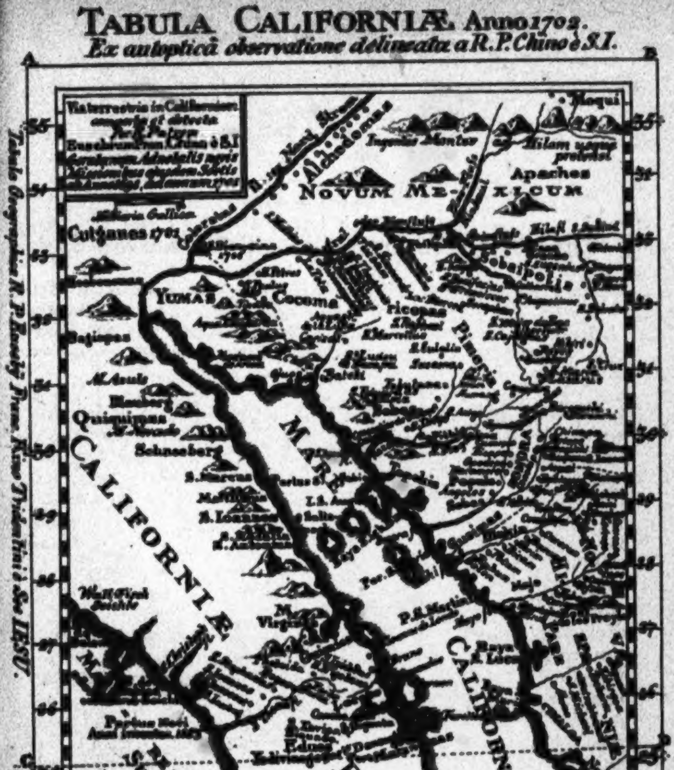
CHAPTER XVII.

THE SPANISH EXPLORERS AND MISSIONARIES.

THE SPANISH DISCOVERY OF ARIZONA. FRIAR MARCO DE NIZA. THE NEGRO ESTEVANICO. CORONADO. CASTANADA. ULLOA. ALARCON. DISCOVERY OF THE COLORADO. ESPEJO. MOQUI AND THE SEVEN CITIES OF CIBOLA. THE PUEBLOS. FATHERS KINO AND ESCALANTE. MISSIONS. PRESIDIOS. PUEBLOS, ETC.

The early half of the wonderful sixteenth century—the years which saw the mysterious empire of Montesuma shattered and the power of the Castilian made firm and enduring, for some centuries at least, were not without important consequences to the strange, wild interior of which for some years the mailed warriors of Cortez had been having their imaginations fired by fabulous stories of wealth and prosperity. The "Seven Cities of Cibola"—cities of the bull—were almost a myth to the Aztecs themselves, whose traditionary lore was laden with the stories of strange adventures encountered in the endeavors of their more hardy warriors and traders to explore the land to the north of their own power, and to deal with the people who inhabited a territory of weird forms and scenes, wild gorges, flooding rivers that forced their way through black and lofty mountains and arid deserts, valley and mesa wrenched from the desolation and made to bloom through industry with homes and harvests. The cupidity of the ruthless warriors and adventurers was excited by stories of fabulous wealth, while their superstition was linked with the devotion of the missionary priests, who were eager to carry their religion to strange peoples, bearing the cross of the Redeemer to meet the phallian cross of the sun-worshipers in their seven cities, reported to be full of gold and glowing with treasure.

Between what now constitutes Arizona and New Mexico and the central States of Mexico, then the seat of Aztec civilization, there lay a wide stretch of country but thinly settled by a race not of the Aztec stock, though allied thereto. The Gulf of California had been discovered and named after Cortez. It had not, however, been explored. Direct reports of the


TABULA CALIFORNIÆ. Anno 1702.
Ex autopticâ observatione delineata a R.P. Chino è S.I.
Moqui
Alchedomas
NOVUM MEXICUM
Apaches
Cutganes 1701
Yumas
Cocoma
Sobaipuris
Bajiopas
Quiquimas
Schneeberg
CALIFORNIÆ
MARE
CALIFORNIÆ PARS.
MARE DEL ZUR SUD-MEER
MARE DEL ZUR oder SUD-MEER
Promont. Lucae
Chaloca
Annotatio.
Tabula Geographica R.P. Eusebij Franc. Kino Tridentini è Soc. IESU.
Tabula Chartae Patris Chino adiecta

JESUIT MAP OF ARIZONA 1698.

famed cities of Cibola were first heard by the Spaniards in 1530. Cabeza de Vaca, a sailor, was shipwrecked in the Gulf, and wandered into the Moqui country in 1535. The Spanish conqueror, Cortez, had been replaced by the Viceroy, Mendoza, when in March, 1539, the Padre Marco de Niza set out to find the cities of Cibola, accompanied by Senor Estevanico, a man of color who had previously served with Narvaez. They left Culiacan, a city of "New Spain," in March, 1539. The priest and his associate reached the Gila river, and discovered the Pima Indians, (no mention was made of the Maricopas) living at the same point in the valley where their descendants are still found. They were four days crossing the desert, apparently a portion of Papagueria. The Indians had neither heard nor seen any of the conquering people, nor had they heard of Christianity. The friar told them of the "Lord God in Heaven," and "the Emperor." These people told the padre that four or five days distant to the east there was a large plain with many great towns thereon, the same being at the foot of the mountains. The inhabitants were clad in cotton. Gold, the friar understood, was so common that it was used for household purposes. The story told by the friar indicates that the Pimas were telling him of the Zuni towns, whose remains are still to be seen on the border of Arizona and New Mexico. From the Pima country, Padre de Niza, with Estevanico, traveled, reaching the region then inhabited by the Zuni people. The adventurous missionary, having heard the reports given by the Pimas, concluded to send Estevanico ahead, who had not traveled far before he received information that the nearest of the seven cities referred to was named Cibola, and distant thirty days' journey.

As pre-arranged, Estevanico sent word to the friar, who followed. The former kept ahead, however, and the friar, after traveling four weeks, was met by one of the Indians who had accompanied Estevanico, returning in great haste and terror. The Indian said that when within a day's journey of Cibola, Estevanico dispatched messengers before him with presents and messages for the Governor, who said that he knew well enough what kind of people they came from, and warned them that if they entered the city he would put them to death. He meant it too; for on the arrival of the remainder of the party they were shut up in a large house outside the city, and the next day, out of more than three hundred men, women and children composing the party, but three escaped massacre by the people. The women and children accompanying Estevanico and his Spaniards were probably from the tribes in Sonora and on the Gila river among whom they had traveled. The negro leader was charged with behaving badly towards the women. Friar Niza, however, was not to be daunted, and concluded to press forward. He reached the city, (or said he did) which he reported to be large, built of stone, and gold and silver more abundant than in Peru; also that he was informed Cibola was the least of seven cities. It does not appear from the translation how the friar succeeded in avoiding the fate that overtook the African and his party, or how three hundred men, women and children managed to subsist *en route*. On the 22d September, 1539, the friar gave to the Viceroy, in the city of Mexico, an exaggerated relation of his journey, which led to an expedition of over a thousand men, (principally Indians) under command of Vasquez de Coronado. The Friar accompanied the expedition, the vanguard of which arrived at the first village of Cibola about forty-five days after leaving Culiacan. Instead of such a large and rich city as they expected to find, it proved to be a small and poor village of about two hundred warriors; the houses were small, three or four stories in height, with terraces on the top. The province was composed of seven villages in a valley six leagues long; the inhabitants united in defence of the first, but being attacked, and dispersed, the whole province submitted. The province of Tusayan (now known as the Moqui villages) was twenty-five leagues north-west from Cibola, and also contained seven cities. In a north-east direction were the cities or villages of Acuco and Cicuye, and between them the province of Tiguex, Tegua, or the farthest—Cicuye—being seventy leagues from Cibola. These, it is evident, were the New Mexico Pueblos. In these the Spaniards were not opposed, and the chief of Cicuye (Bigotes) even offered, by messengers sent to Cibola, the services and friendship of his nation, and they were accompanied back to Cicuye by twenty Spaniards; notwithstanding which, he and the cacique were not long afterwards arrested by the Spaniards. This, with other gross provocations, caused an insurrection in Tiguex, which contained twelve villages; it was suppressed, but the inhabitants left for the mountains. In May, 1540, the army left Tiguex for Cicuye, twenty-five leagues distant, on arrival at which Bigotes and the cacique were liberated; and the army, supplied with provisions here, went north-east six or seven days' journey, where they for the first time found buffaloes, and Indians, called Querechos, who in the main subsisted upon them. Their habits were described with such minuteness and correspondence with the habits of Indians who inhabited that locality at a very recent date, that there can be but little doubt of its genuineness, and that the expedition had reached the Canadian river. Coronado here sent back his main body to Tiguex, but proceeded still farther north with thirty-six men, met with other wild tribes, who were very friendly, and is supposed to have reached to 40° latitude; but, on account of the lateness of the season, he returned to Tiguex and spent the winter of 1541–2, and soon afterwards the Spaniards evacuated the country. Some time previously the monk, Marco de Niza, had returned to Mexico, his life not being safe at Cibola on account of his false report which led to the expedition. It is not improbable that, knowing the Spaniards would not undertake such an expedition unless in view of bullion, and seeing much to be done in the way of soul-saving, his yarn was merely intended to secure the latter object. Castañeda, who participated in Coronado's expedition, estimates the population of the fourteen villages of Cibola and Tusayan at three or four thousand, probably warriors, and at 16,000 that of the villages in the valley of the Rio Grande. This is equivalent to a total population of 60,000. The inhabitants were represented as being very sensible, intelligent, and industrious; there was amongst them neither drunkenness, stealing, or unnatural sin; they were not cruel, never ate human flesh, and made no human sacrifices. He is silent as to their religion. Their diet was mostly vegetable, such as maize, beans, pumpkins, and mesquite.

Antonio de Espejo, a citizen of Mexico, left San Bartolo on November 10th, 1582, and went northward, traveling a region well populated, and reaching the Pueblo region found more numerous and populous cities than those mentioned in connection with Coronado's expeditions. They also visited Tiguex, and describe Acoma (a pueblo still inhabited) as containing over six thousand persons and situated on a rock fifty paces in height, having no entrance but by stairs hewn into the rock. Two days' journey from Tiguas (Tiguex) they found a province containing eleven towns and about 40,000 persons. The province of Los Quires had five towns and 14,000 persons. Other populous provinces are mentioned, including one town containing 20,000 inhabitants—Cia, in the province of Purames or Cumanes. The inhabitants presented them with mantles curiously wrought, and showed them rich metals and mountains near by containing the mines. West of Zuni twenty-eight leagues, they found a town called Zuguato, the inhabitants of which received them with great joy, pouring maize on the ground for the horses to walk upon, and offering a gift of 40,000 mantles of cotton and rich metals. Thence traveling due west about forty-five leagues they found in a mountain rich silver mines of which they had been informed. In the vicinity of the mines there were numerous Indian pueblos; they also found two rivers of reasonable size. The localities correspond with those of the Moqui villages, the Francisco mountain, the neighborhood of Prescott and the Salt river. The rivers are probably the Colorado-Chiquito, the Verde and the Salinas. Espejo returned to Mexico in July, 1583. He seems to have had considerable missionary zeal, which may have led him to see a good deal too much for truth—as in the case of the Friar Marco de Niza. Castanada's narrative accords strictly with subsequent discoveries, is regarded as eminently truthful, and was as accurate as could be expected from anything written twenty years after the observations were made. He does not mention towns of any such population as Espejo states, though he was acquainted with several of them. But if Espejo was anyway near accurate, a vast region now containing only a few insignificant villages must then have been interspersed with populous cities and settlements. He mentions places visited by him aggregating 140,000 inhabitants, besides 40,000 in a province to which he was refused admittance.

On September 28th, 1595, Juan de Ornate applied for permission and assistance to establish a colony there, which he appears to have carried into effect. During the seventeenth century several Franciscan monks established missions among the Indians of Moqui and Nabajoa (Navajo). In 1680 the Spaniards were massacred or expelled from New Mexico, but in the ensuing year re-entered it, and after ten years' war reconquered it, except Moqui and Nabajoa. The Moqui killed their instructors, and were never afterwards reached by the missionaries, on account of obstacles interposed by intervening tribes, though some attempts were made by the Jesuits. All the records of New Mexico were destroyed in the insurrection of 1680. The Spaniards re-occupied the country in part in 1695. So far as the Santa Cruz valley was concerned, the zeal of the missionary effort in Arizona was half a century later, when it began to assume importance.

In the "Conquest of New Mexico, by Juan de Ornate," it is stated that the natives were probably disturbed less than was usually the case with the vanquished race. The Pueblos being well-domiciled and well-behaved, and having little to be stolen, the invaders adopted the wise policy of permitting them to work in peace, and to retain the customs and traditions of their forefathers, as they do, many of them, to this day. Attempts have been made to prove a relationship with the civilized Aztecs of Mexico, but thus far without success. No affinities in language appear to exist. The New Mexican pueblos are situated some in valleys, others on mesas; sometimes they are planted on elevations almost inaccessible, reached only by artificial grades, or by steps cut in the solid rock; some are elliptical, others square, a town being but a block of buildings. Then a pueblo consists of one or more squares, each enclosed by three or four buildings, 300 or 400 by 150 at base, and two to seven stories, of from eight to nine feet each in height. The buildings forming the square do not meet, but in some cases are connected by bridges, or covered gangways, and in some instances the houses project over the street below, which, being narrow, are thus given an under-ground appearance. The stories are built on a series of gradations, or retreating surfaces, decreasing in size as they rise, thus forming a succession of terraces. The outside walls of one or more of the lower stories are entirely solid. All the doors and windows are on the inside, opening on the court. Access is had to the different stories by means of the ladders, which at night, and in times of danger, are drawn up after the person entering. The rooms are large; the substantial partitions are made of wood, and neatly whitewashed. Those on the ground floor are generally used as store-rooms; those above are sometimes furnished with a small fireplace. Houses are common property; the men erect the wooden frames; the women make the mortar and build the walls. The inhabitants of some of the ruined towns appeared to have had a knowledge of architecture superior to that possessed by the pueblos of the present day, whose buildings, however, are well constructed, and taken great pride in by the Pueblos, who claim that as fortresses they have ever proved impregnable. "To wall out black barbarism, and to be let alone, was what the Pueblos wanted; under these conditions time was giving them civilization."

The sweat-house, or as the Spaniards call it, the *estufa*, consists of a large excavation, the roof being nearly on a level with the ground, supported by heavy timbers or masonry, which is at once bath-house, town-house, council-chamber, club-room and church. Every village has from one to six of them. In some of the ruins they are found four stories in height. At Jemes it is of one story, 25 feet wide by 30 feet in height. At Bonito they are 175 feet in circumference. In these subterranean temples the old men met in secret council, or assembled in worship of their gods. Here are held dances and festivities, social intercourse, and mourning ceremonies. The estufas of Tiguex were built underground, both round and square, and paved with large polished stones. The Pueblos displayed much taste in painting the walls of their estufas, where are represented different plants, birds, and animals, symmetrically done, but without any scenic effect. Hieroglyphic groupings, both sculptured and painted, are frequently seen in the ancient pueblo towns, depicting, perhaps, their historical events. With colored earths their pottery is painted in bright colors. Many Spanish authors mention a great many gold and silver vessels in use among them, and speak of the knowledge they had in reducing and working these metals; but no traces of such art are found at present. The Pueblo Indians and Moqui are noted for their personal cleanliness and the neatness of their dwellings. In the manufacture of blankets, and of cotton and woolen cloths, they excel the Navajoes, although employing essentially the same method. Although the women perform most of this work, as well as tanning leather, the men are said to be expert in knitting woolen stockings. They have great droves of horses, mules, donkeys, cattle, sheep, and goats; also large numbers of poultry, turkeys, and dogs about their houses. "All the inhabitants of the citie," (Cibola) says Friar Niza, "lie vpon beddes raysed a good height from the ground, with quilts and canopies over them, which couer the sayde beddes."

Castanada's account of the Coronado expedition gives the length of the Grand Cañon of the Colorado at 100 leagues, and the depth at 5,000 varas—measurements which have since been verified by the explorations of Ives and Powell. One branch of Coronado's expedition descended the valley of the Colorado by land to the junction with the Gila, where they were met by Fernando Alarcon, who in May, 1540, had been sent up the Gulf of California by sea, with an expectation that he might assist Coronado's land expedition in reaching Cibola. He discovered the Colorado river, which he ascended one hundred miles in two shallops drawn by men on shore. The country was thickly inhabited; the friendly natives raised maize, beans, and pumpkins, and worshipped the sun. He made a second ascent still higher up, meeting several distinct tribes. He also collected some information concerning Cibola; the Colorado people had heard of the negro Estavanico having been killed by the people of that place, and had rumors of the subsequent invasion by Coronado. They said a desert intervened between the river and that place, of ten to forty days' journey, which none of them would undertake. Alarcon met tribes on the Colorado river that spoke the same language as the Indian interpreters who accompanied him from Mexico city and Culiacan. In the same year, from information received at the province of Tusayan, (twenty-five leagues north-west of Cibola) Coronado sent Lopez de Cardenas with twelve men, who struck the Colorado after twenty days' march across the desert, where the cañon walls were over a thousand feet deep and impenetrably precipitous. They soon returned to Cibola.

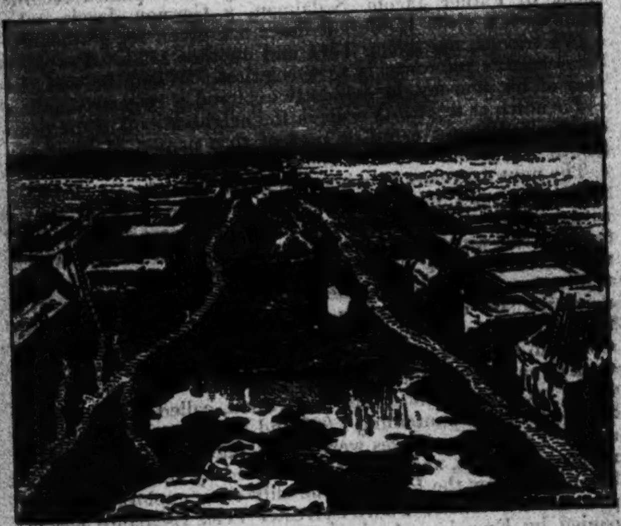
Francisco de Uloa partially explored the Gulf of California in 1539, and Fernando Alarcon found the mouth and entered the Colorado river two years later, navigating it for over fifteen leagues until he reached the lower end of the Great Cañon. In spite of these earlier discoveries, it was not until Father Kino's explorations from 1698 to 1704, that the peninsula of Lower California was found not to be an island, as had been supposed up to that date. Alarcon found Indians gathering maize and cotton, and the wild poppy growing in abundance. He also reported twenty-three different languages, or diverse dialects, spoken by as many different tribes. These people told him that the river ran much further inland, and it is very evident by the traces found of ancient towns in cliffs and on plateaux that the valley must have had a much larger aboriginal population than has at any time been the case since our own people have had any knowledge of its wild and wonderful physical features. There is a map of the Gulf in possession of the Cortez family, drawn in 1541 by Domingo de Castillo, which shows two rivers as emptying therein. One located at 30° 40', (the Magdalena) was called the Rio de Buena. The other is marked as the Rio Brazo de Mina Flores. Father Pedro Nadal, in 1538, located its mouth, (probably the Colorado) as 35°. Father Niza made it 34° 30'.

Spanish traditions are silent for nearly a century and a half, so far as the territory now embraced within Arizona was concerned. The Jesuit Fathers established the mission of St. Gertrude de Tubac, forty-six miles south of Tucson, in the latter part of the sixteenth century. The "Rudo Ensayo" states that the missions on the San Pedro river were built previous to 1694. Solorano, a Spanish writer of the reign of Philip III, mentions the old missions; and in the "Cronica Serafica," of about the same date, there is a long account of the early explorations, the old missions, and of the Indians then in Pimeria Alta, who were estimated at 75,000. In 1694 the Padre Eusebius Francis Kino, accompanied by Padre Mange, (who wrote an attractive history of the expedition) visited the Gila river, entering from Sonora by the Santa Cruz valley, passing by the Santa Rita mountain, and by the sites of the present towns of Tubac and Tucson, visiting the Pima Indians, and thoroughly examining and exploring for the first time the Casa Grande ruins; a most interesting account of which his secretary, Father Mange, has preserved to us. The Pima traditions extended back nearly four centuries, and it was then a ruin. Father Mange's description shows the ruins to have been in a remarkable state of preservation, and to have been quite extensive. Ruins of dwellings, acequias, etc., were found for many miles along the Gila. Mention is made in this narrative of the Coco-Maricopas, as having their homes on the Salt and Gila rivers, but not with the Pimas. The reverend explorers passed down the Gila to its junction with the Colorado. Father Kino made five journeys in all to the region named, between 1694 and 1706, a period of twelve years. Two missions were established by him, one at the mouth of the Colorado among the Cocopahs, and the other at the mouth of the Gila, or opposite thereto, for the benefit of the Yumas. This last mission was in existence for nearly a century, though not supplied.

In 1720 the missions were prosperous and flourishing, and in Sonora, including what is now Arizona, there were twenty-nine, with seventy-three pueblos or villages, in charge of the Jesuits. In Arizona proper there were, besides that of Tubac, the missions of San Xavier del Bac, Joseph de Tumacacori, San Miguel Sonoita, Guavavi, Calabasas, Arivaca, and Santa Ana. There was an outbreak of Indians in 1751, who destroyed some of these churches and killed most of the priests. In 1769 the Marquis de Croix, Viceroy of Mexico, sent to the Superior of Santa Cruz in Europe, and had fourteen priests sent out to the new world to fill the places of those killed by the Indians in this outbreak, one of whom afterwards founded the mission church of San Augustine at Tucson. The first mission church of San Xavier del Bac was founded at a very early date, now unknown; and on its ruins was commenced, in 1768, the present church building, the only one of the old missions still in use. Since 1720 to date forty-seven priests of the Jesuit and Franciscan orders have been stationed in Arizona, of whom more than one-half have been murdered by the Indians or died from privation and suffering. In 1776, when a new era of missionary activity began, Fathers Pedro, Garcia and Elrarch arrived and replenished the mission; Father Garcia was killed soon after by the Yumas, and the mission edifice was finally abandoned. A part of the materials were used by Major Heintzelman in the construction of Fort Yuma in 1851.

The next missionary explorer, (and the priests seem to have been the only adventurers of the day) is mentioned by Schoolcraft as a Jesuit Father who visited the Gila and the Casa Grande ruins in 1764. No name is given. Spanish records speak of Father Jacobi Sedalman, a German Jesuit, who made such a visit. Different dates are given for Father Jacobi's travels, one being 1744 and another 1774. Probably Schoolcraft's reference is to this priest. Whatever was the year of his journey, he evidently explored a large area, going as far north as the Rio Verde, in the neighborhood of the present United States camp or post of that name. He wrote at length of the ruins found in that latitude.

The next travelers of whom mention is made are Fathers Pedro Font and Francisco Garcia, who made a careful exploration of the Gila from the vicinity of Florence westward. Spanish rule was then established as far north as Tucson, which under the name of Tulquson had been a small presidio and trading post for several generations. Padre Font prepared a narrative and map, which is still valuable. The missionaries left central Mexico on the 20th of April, 1773, and reached the Colorado the next spring. They gave a minute account of the Casa Grande, and of the Indians they met. Two towns were found on the present Pima reservation, called Uturituc and Sutaguison, one containing 1,000 and the other 5,000 inhabitants. Two other villages were found, one—Opas—being fifty miles to the west, and the other occupied by Maricopas, thirty-five miles below the Pimas. The only other exploration of importance was that of Padre Sylvester Velez Escalante, accompanied by Francisco Atanaco Dominguez. They were both Franciscans. This order divides with the Jesuits the honors of missionary explorations in this region. Escalante was the first Spaniard to visit the Moqui towns since Coronado's visit and defeat. It is from the narratives of Fathers Font and Dominguez that Humboldt derived his knowledge of the old Arizona ruins and of the traditions given in relation to the Aztecs having lived in latitude 35 to 37 deg., during the thirteenth century. From the manuscript of the Abbe Dominguez, as well as from that of Font, it appears that Father Escalante's party began their journey on July 29th, 1776, and ended it in January, 1777. They started from Santa Fe, traveling northwest, intending to reach Monterey, California. The extreme northern point of their journey skirted the Uintah mountains, in Utah, then bending south again very near the outlet of Salt Lake. From thence they travelled nearly south-by-west, until they reached a point one degree from the great Colorado Cañon. Their extreme northern point was in latitude north 41 deg., and longitude 112 deg. The extreme western point reached was at longitude 114 deg., and latitude 37 deg. The



MOQUI VILLAGE.

extreme southerly point touched was at El Moro, New Mexico, on the 35th degree, and 108 deg. latitude. This comprised a journey of at least 1400 miles. Of this about 360 miles were within the present boundaries of Arizona. Another journey was made at the same time by Padres Font and Garcia in 1777, who travelled from San Gabriel, California, to Oraybe, one of the Moqui villages, and thence to the Rio Mojave. Regular communication was had, according to Gen. J. H. Simpson, as early as 1716 between Santa Fé and San Gabriel, *via* the Colorado plateau and Moqui villages, termed the province of Tusayan, a name which has lately been revived by Major Powell.

At about latitude (October and November, 1776) 36 deg. 20 min., Escalante received confused information about the Colorado. He got near the Great Cañon at last, searched for a ford, and finally crossed, November 8th, in or about latitude 37 deg. and between longitude 111 deg. and 112 deg. west of Greenwich. The party lived on their horses. They found good trails, however, on the high table lands all the way to the Moqui. From thence they went to Zuni, where there was a Mission, which they reached January 2nd, 1777. Escalante found the Moqui opposed to Christianity. They had partially accepted it and then apostatized. He interviewed their chiefs or caciques at length, but they would not accept either it or Spanish rule. The Moqui were kind, but did not like his visit or that of Father Garcia. This journey seems to have ended the work of missionary exploration. The labors of the reverend Padres were confined in Arizona to the Santa Cruz valley, that of the San Pedro and the vicinity. The section was first traversed in 1683. In 1776, at the date of American Independence, forty missions were in existence within the Gadsden purchase, some eighteen being within the confines of Arizona itself. The work of the missionaries is still seen in the industry, fidelity and chastity of the Papago Indians, and in a less degree testified to by the Pimas. Elsewhere ample tribute has been paid their zeal, and no more remains to be added, except to say that the narratives left by them of travels and observations are not only quaint and attractive, but illustrate forcibly how pursuit of one object can warp judgment and pervert reports.

CHAPTER XVIII.

THE ANCIENT PEOPLE OF ARIZONA.

WHO WERE THE ANCIENT PEOPLE ; TOLTEC OR AZTEC. DIFFERENT THEORIES—HUMBOLDT, GREGG, BELL, DOMENECH, PRESCOTT, ABBE DE BRASBOURG, BALDWIN, BANCROFT. CHARACTER OF ARCHITECTURE ; ENCLOSED HOUSES ; COMMUNAL DWELLINGS. ZUNIS. MOQUI PUEBLO. CONCLUSIONS.

No more interesting pursuit can be found by any one desirous of uniting study and activity, provided other qualifications of education, experience and readiness justify application, than a field examination of the very remarkable ruins which are found in the Territory of Arizona, the valleys of the Rio Grande, Chelly, Zuni, and a few other small streams in the northwestern portions of New Mexico; in the San Juan valley, that of the Rio Animas and their vicinity in south-western Colorado; along the cañon region of the Colorado river, and in the extreme northern portion of the Mexican state of Chihuahua. Mr. Bancroft, the historian of the "Native Races of the Pacific Coast," estimates the area sparsely covered by the remarkable ruins to which reference is made, as having a base of 400 miles and a perpendicular of 300, the first being located along the Gila river on the 33rd, while the 38th parallel forms the northern line. The east and west lines are located on longitudinal degrees of 107 and 113° 40′ west. In order to embrace all the ruins known as related to each other, the southern base must be pushed south to very nearly the 31st parallel of latitude, and thereby include the ruins of Chihuahua.

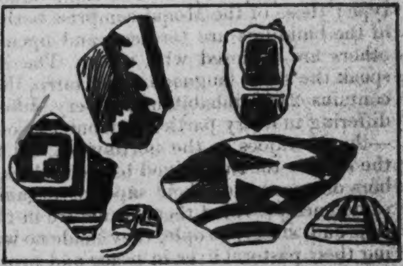
The origin of these remarkable evidences of a marked, if not far advanced, industrial civilization is, so far as present research extends, lost to us. Nothing has been found, as yet, of sufficient distinctiveness to enable the most intelligent of students and observers to more than speculate or form an ingenious hypothesis. So far, enquirers and observers, with a few exceptions, have contented themselves by dismissing the subject with the suggestion that the ruins of Arizona are the work of the Aztecs, who were found by Cortez and his compatriots the inhabitants of central Mexico, participating in the power and glory of a distinctive civilization, marked in many respects by a high degree of refinement and capacity—a civilization evidently indigenous in its character, homogeneous in spirit, climate and people, growing from original germs and bearing all the marks of such an origin. As will be seen in the progress of this chapter, however, the theory that the Arizona ruins were the work of this Aztec race and its cognate branches does not seem to be borne out by the pivotal facts of constructive art which alone are preserved to us. And yet it is possible that the race that formed the Aztec Empire, as Cortez found it, moved from their supposed original homes, in south-west Colorado, down the Rio Grande, until they entered central Mexico and overthrew the Toltec Empire. Baron Humboldt, who was the first of European savants to make a thorough examination of Spanish-Mexican records as preserved at the City of Mexico and Madrid, broached the theory that the Aztecs originally inhabited the country between the 35th and 38th parallels of north latitude and the 107th and 110th degrees of west longitude. This was during the twelfth and thirteenth centuries. The indicated region embraces the Zuni country, many of the Pueblo communities, the province of Tusayan, or Moqui country, and the San Juan valley, in Colorado, in all of which there are remaining evidences of a wide-spread population and of a somewhat advanced civilization. One other fact may or may not corroborate this theory of Humboldt, which also presupposes an utter abandonment of all the environment of such a state in its full activity and acme of progress. The Navajoes report to Professor Jackson, of the Hayden Geological Survey, and others, that the Colorado ruins were visited by their forefathers "five old men's ages ago"—that is, five hundred years since—and that even then they were in ruins. The Pima Indians reported to Father Kino, in 1698, that the Casa Grande ruins were in the same state at least three hundred years before, which seems to be as far back as their traditions run. Here are two facts, then, that seem to coincide with the theory that Humboldt advances of the Aztecs' place of residence in the twelfth and thirteenth centuries. But, to support such an utter abandonment of settled habitations, it will be necessary to suppose some strange impelling reasons, either in climate or other causes, that must have amounted to a catastrophe. The hypothesis which would leave a whole race able to conquer an empire, and preserve power enough to abandon without destruction their old homes, implies conditions and forces without a known historical parallel.

North of the 20th parallel, at the date of the Spanish conquest, Cortes and his successors found, so far as they penetrated, but few inhabitants. The Chickiemecs, (of Sonora) and the Otomites, ranging in Sinaloa and Durango, were a pastoral people, occupying an intermediary position between the Aztec civilization and the village communities of the Rio Grande valley, or the town-builders and dwellers of the Rio Gila, Salinas, and Verde, who lived by cultivation of the soil and the raising of grain and fruits. So far as the Mexican Empire was concerned, the Aztec tables show that the Toltecs appeared in the region embraced by the present central states of Mexico about the year 648, coming from the east and northeast. Their empire expired, or was subjugated by irruptions of aboriginal tribes or peoples, who maintained an interregnum until 1196, when the Aztecs appeared, moving from the north towards the south. The intermediaries were the Chickiemecs, who were uppermost in 1170, and the Nahantecs, whose date is 1178. John D. Baldwin, editor of the Worcester (Mass.) *Spy*, and the author of an interesting work on "Ancient America," reviewing the various facts that have been elicited by research, and the theories built thereon, takes the ground that the architectural remains of the Toltec and Aztec peoples, as well as of the greater race or races whose civilization antedated theirs in central America and southern Mexico, show a different *norm*, or beginning, each from the other, and that as a necessity the other institutions and characteristics must also have widely differed. It is pointed out that the Aztec civilization was always communal and tribal in its character; that their government was never national, and did not even assume the federal form, and that a marked and germinal evidence of these things is to be found in the character of both the public buildings and private dwellings of that people. From the palace of the Montezuma to the humblest pueblo village, the terraced dwelling, enclosed on three sides, and open to the east—the rising sun—capable of housing the inhabitants of a whole village, and often, indeed, of a moderate-sized town, belongs to and marks the existence and limits of Aztec life and power. On the other hand, it is seen that the Toltecs were a people who dwelt in separate buildings, enclosed on all sides, and generally constructed in towns, in the center of which were found the municipal and other public buildings, the temples, etc. Again: it is claimed that the four centuries of Toltec life and dominion in Mexico have left evidence to indicate that their mode of government was of a federal character, verging most distinctly towards a national form or type.

The Toltec architecture, as seen in its acknowledged remains, shows, as already observed, enclosed buildings, providing for separate homes and family life. These buildings are found to have been always set true to the compass. The walls slope slightly inward, and the windows and doors have the same characteristic. These peculiarities are noticeable in the Yucatan and the other remarkable ruins in central America, and they are distinctly so in the Gila Casa Grande. Whether the Toltec impressed this form upon ancient Mexico, or from an older life received it, is a question likely to remain unsolved. Mr. Baldwin advances the theory that the Toltecs who conquered Mexico were also the mound-builders of the Mississippi and Ohio valleys. He meets the difficulties that such a theory encounters at the outset, by suggesting that the buildings he believes to have been constructed on those mounds were of wood and other perishable materials, while the mounds of central and southern Mexico, and those of central America still to be found, were crowned by buildings constructed of stone—generally temples, it would appear. The nature of the materials used has enabled us to trace their character and extent. The Toltecs were mound-builders and mine-workers also; they lived in towns, and built enclosed dwellings, maintained a federal government, and so proved that they had passed beyond the tribal and commercial forms. Albert Gallatin holds these views, as well as later writers. A statement of these points seems necessary to illustrate the probable origin and character of the town-builders of and dwellers in Arizona and southern Colorado; and they will also serve to show the different idea that governed the pueblo or village communities, whose lingering identity and struggle for existence makes so interesting a feature of New Mexican history and affairs.

The first American writer to call attention to the interesting ruins now under review was Mr. Gregg, author of a still valuable book on "The Commerce of the Plains." He refers to the Casa Grande ruin, on the Gila, and to those in Cañon de Chaco and Rio de Chelly, in Arizona and New Mexico. He endorses the assertion made by the Spanish historian, Claverigo, that all the ruins existing in New Mexico and Arizona are of undoubted Aztec origin. Professor Bell, in his interesting work on North America, endorses this view, and considers the town-builders of the region under consideration as the Aztec skirmish line. Under them the rich valleys were occupied, and the Apaches driven to the mountains, and kept there as irreclaimable savages. Owing to the needs thus imposed, "they introduced the art of building houses of stone and adobe; they chose the most commanding positions, * * overlooking large tracts, * * and added story to story in such a manner that a few resolute defenders could keep almost any number of assailants at bay." He held that the town-builders pushed their way north until stopped by the Rio Colorado and its cañons. The Moqui villages were established, and eastward the kingdom, or Seven Cities, of Cibola, of which Zuni is a remnant, pushing into the wilderness through what is now the Navajo reservation into the valley of the San Juan, where they must have lived in great numbers, as the abundant ruins lately discovered by Hayden's exploring expedition sufficiently prove. At the same time they also pushed east into the Rio Grande valley, where they gradually lived in open towns, and no longer felt obliged to live together and fortify themselves. The Abbe Domenich, a writer of learning and acumen, regards the ruins as Toltec in origin, and believes they were built early in, or just before, the twelfth century. He attributes the disappearance of the great population that once lived where these ruins are found, to a great physical change which made fertile valleys and basins become barren and arid. The mountains and plateaux were denuded of timber, and the whole country became, as Dr. Newberry phrased it, "over-drained." Our own Prescott takes the opposite view, and does not regard the Arizona remains as Aztec in character, but rather as the work of the Toltecs, or their contemporaries, the Tezcucans. He considers them as far too rude to be the work of those who constructed "the temple of Xochicalo, or the palaces of Tescotzina, and the colossal calendar stone" in the city of Mexico. Other American writers who have paid attention to this subject lean decidedly to Prescott's view of their character.

After close examination of the evidence presented in the more pronounced of these remains, and a comparison of the striking differences to be observed between the eighteen pueblos still existing in New Mexico, with the ruins that are found about them, and those of Arizona and Colorado, the conclusion has been reached by the present writer, that there were two distinctly marked strains of life and activity, one of which it is apparent was much older than the other. The New Mexican pueblos, including the Zunis, (who, however, are of an older stock, that have been affected by a conquering or impressing civilization) belong distinctly in this writer's judgment to the Aztec form of life; while the people who left the evidences of their progress in the wide-spread town ruins of Arizona and south-western Colorado, and of their decadence and ruin in the cliff-houses and caves of the great and little Colorado cañons, and by other remains scattered as far north as the Utah basin and portions of Nevada, belong to an earlier civilization—probably that of the Toltecs, or some of their contemporaries who were affected and controlled by the distinct forms which that people presented. If Mr. Baldwin's suggestion is of value as to the migration of the Toltecs, (and it is sustained by the investigations of the Abbe de Brasbourg) may it not be possible that such a movement divided, and that a smaller stream flowed almost directly west, instead of, as the main body did, to the south-west? If the hypothesis here presented should turn out on further investigation to possess reasonable correctness, another fact might readily be accounted for. The Arizona and Colorado ruins show far more advancement in buildings and agriculture than they do in tool-making or other mechanical arts. So far, none but stone tools and implements have been found; while the ruins of extensive buildings of fair construction, and wide-spread remains of irrigation works, showing considerable engineering ability, are to be seen far and wide. In fact, these evidences serve to show an "arrested civilization," not an advancing one. If we mistake not, stone tools and implements both of peace and war are characteristic of the mound-builders also. There is another utilitarian art in which both seem to have reached a fair degree of progress; that is, the making of pottery. The colors, style, and geometrical ornamentation which characterize the fragments of pottery found in the Arizona ruins are similar to the vessels and fragments thereof found in the mounds of the Ohio and Mississippi valley, as well as similar to those that have come down to us from old Mexitile. The Toltecs introduced the cultivation of maize and cotton; they built cities, roads, and pyramids, found metates, (the rude stone hand-mills by which the Mexican and Indian women still grind their corn, or other grain) cut the hardest stones, and made a perfect

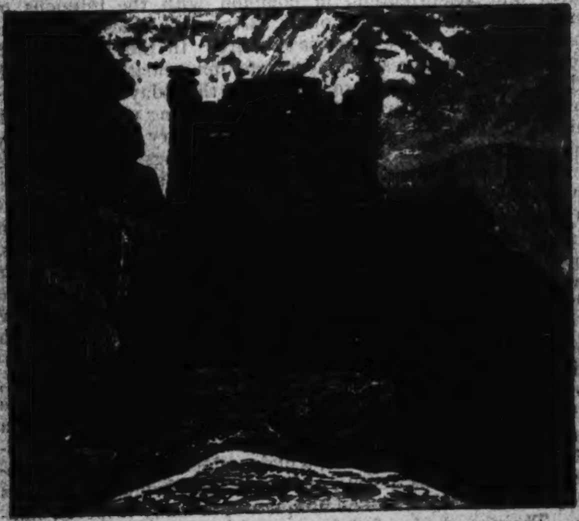


FRAGMENTS OF ANCIENT POTTERY.

solar year and calendar. In Mexico they used metals. In Arizona not a trace of such use has yet been found. Taking all things into consideration, the writer is led irresistibly to the conclusion that the Arizona town-ruins owe their origin to the earliest phases of Toltec activity, or else, as Prescott suggests, to the efforts of a contemporary people. As to their destruction, another chain of reasoning and deduction must be followed. In regard to the views of Gregg, Bell, and Domenich, already quoted, it must be borne in mind their acquaintance did not extend practically beyond the pueblo buildings of New Mexico, and that later and more complete investigation has brought to light facts of which they could have had no cognizance.

The Rio Grande pueblos seem, under this theory, to have been a result either of the early Aztec life in that locality, or—what seems more reasonable—to the efforts of trade and conquest that this people were constantly making after they became powerful in central Mexico. There seems more soundness in attributing to the Aztecs a home in the northern part of Mexico somewhere between the 20th and 30th parallels, than there is in locating them five to eight degrees north of the high point named. There are race-strains to be found among the pueblos different from those seen in the majority—as, for instance, the Zunis are evidently from a stock superior to that of their pueblo contemporaries. The Zuni buildings are of the Aztec type; those of the Moqui comprise both characteristics. Two of the buildings are terraced and open on the east side, the others are enclosed with walls. The inhabitants do not all speak the same language. In Harro, the largest town, which contains 2,000 inhabitants, a very different tongue prevails, differing in every particular from the other tribes about them—the Navajoes on the north-west, and the fierce Apaches on the south—the Zunis lived to themselves, feared by their neighbors on account of their superior organization and the means of defence provided them by nature in their elevated plateaux. A proud, stately people, they made no wars of aggression, leading their pastoral lives in peace and prosperity; the men raising sheep, goats and cattle, tilling the ground, and the women spinning and weaving their clothing, raising fowls and taking care of their houses, in which womanly virtue they are still said to excel; their cooking being remarkably good, and their two-story dwellings neat and clean. They are, moreover, quite comely, and noted for the modesty of their dress, which consists of a skirt of graceful length, made of homespun black woolen cloth, and a scarf folded across their breast, their head-dress being their own glossy hair neatly braided. As a people they are devoutly pious, and their religious ceremonies are not unlike our own. Although some traces of missionary teaching are evident, the leading tenets of their faith are identical with what is known of the religion of the ancient Aztecs. That race had their doctrine of an Immaculate Conception, Crucifixion and Resurrection, in common with the religions of ancient India, Persia and other eastern countries, as well as the later phase known as Christianity. In the Aztec belief, Suchiquecal bears a son, Quexalcote, immaculately conceived, who was crucified and rose again after three days. Their worship is directed toward the sun, as the abiding place of the Almighty; but they do not worship the luminary itself, as falsely supposed. Students of Swedenborg's writings will recognise a similarity of doctrine here: the Lord appearing in the heavens, according to the Swedish seer, to the eyes of spirits as a sun, never being seen in actual form. Just here, mention may incidentally be made of a tradition among the Pimas, another peaceful tribe, that if, from the yellow clay of their native soil, a virgin shall succeed in fashioning a perfect image of a new-born infant, the Great Spirit would accept it, endow it with life, and it should become his representative on earth and leader and Saviour of the tribe. Modelling must be considered one of the lost arts with the Pimas, for there is, as yet, no record of successful competition; nevertheless, they decline to take any stock in the white man's god, as they maintain a genuine Saviour would never have died. The Zunis claim direct descent from the Aztecs, a claim which their mode of construction, traditions, jewels, and much knowledge they possess would seem to ratify. The Moqui are, in many respects, similar. Their methods of defence against enemies are unique. When attacked they flee to their high plateaux, and drawing up after them the ladders by which they ascend, they cut off all communication. One village of Tehuas shares the mesa of the Moquis for mutual protection. They have now seven towns in eastern Arizona, and number between 4,000 and 5,000.

The ancient ruins described are nearly all of the most desolate-appearing character. Nature does not here, as elsewhere, cover with a loving hand the ruin wrought by time or the devastation of men's own hands; she seems rather to rejoice in augmenting both. But barren and arid as are now the huge wastes of plateau, swept by whirling sand-storms or chilled by the blasts of winter; weird and fantastic as are her manifestations in the strange and hideous cacti—the very ghosts and goblins of the floral world—jagged, rock-ribbed mountains, and chasms where death lurks unseen; here are evidences, all around us, that once human hearts, with their hopes and fears, loves and hates, ambitions and despairs, found here a home, loved, protected, and fought for till death. In all probability, explorers of this region will learn more of the former inhabitants from the traditions of the Moqui and the Zunis than from any relics, however interesting, that may be exhumed. That these people, particularly the latter, possess such records of their own extraction seems pretty certain, from the evident unwillingness with which they impart information, although otherwise a friendly and hospitable people in their intercourse with the whites.



ANCIENT WATCHTOWER.

To sum up, the Arizona ruins show: 1. Remains of extensive towns, with large buildings in the center; 2. Evidence of extensive fortifications; 3. Of mounds, probably ruins crumbled away, excavations and enclosures, the purposes of which are unknown; 4. Traces of extensive works for irrigation; 5. Some evidences of mining, with signs of efforts at careful obliteration; 6. Pottery and stone implements; 7. Painted or cut figures; 8. Proofs that the ancient people were cremationists and planet-worshipers.

The buildings consist of stone and concrete, or *cojon*, the latter being usual in the southern portion of the area in which they are to be traced, and the former in the northern portion of the region.

Mr. Bancroft, the historian referred to, concludes: 1st. That these structures do not bear any internal evidence of their age. Many were flourishing towns when the Spaniards came in. 2d. That these relics and ruins "bear no resemblance whatever" to other groups in the South. The mounds of the Mississippi valley, the pyramids of Anahuac and of the central Mexican plateau, the ruined cities of Yucatan and Copan, are not, in his judgment, in any way identical. There is not the slightest resemblance to the evidences of prehistoric human life left elsewhere on the continent. He does not believe that they are the Aztecs or any people like them, as they were found in Anahuac. 3d. The Pueblos and Moqui still inhabit similar buildings. To their prior development must these remains be traced. 4th. Arizona, New Mexico and northern Chihuahua were once inhabited by a semi-civilized people, agricultural in character. They were found by the Apache. They have nearly disappeared, and their works have crumbled under the oppression of the Castilian and the fierce warfare of the savage Apache.

With all due respect to Mr. Bancroft's acknowledged ability and his research, we are disposed to dispute his first conclusion. Of the Arizona and southern Colorado towns, all the evidence goes to prove them to have been in ruins when the Spaniards first explored the land. Mr. Bancroft's conclusions all turn upon his failure, as we see it, to perceive the difference between the Arizona and Colorado ruins proper and the pueblo buildings of the Zuni and Rio Grande communities.

CHAPTER XIX.

THE ANCIENT RUINS, THEIR EXTENT AND CHARACTER.

First European Discoveries. Castenada's "Red House." The Casa Grande, as Seen by Fathers Kino, Mange, Sedelman, Font and Garcia. Mr. Bartlett's Visit. The Aztec Syndicate Party and the Ruins in 1877. The Salt River Mounds and Canals. What Hodge Says. Emory's, Whipple's, and Johnston's Discoveries. The Ruins to the North. A Careful Summary. New Mexico and Colorado Ruins. Area Embraced. Cause of Their Destruction. The "Coming Country."

Father Niza, the romancing priest, who in 1539 visited the Gila river, and from there went to the Zuni country, then claimed to be that of the "Seven Cities of Cibola," was the first European of mark who saw the evidences of an ancient and prehistoric civilization still to be found within the borders of Arizona. Four years before, a Spanish sailor, shipwrecked in the Gulf of Cortez, (California) visited the Moqui country, and afterwards reported in Mexico of what he saw. The traditions reported to the Spanish adventurers and conquerors by the Aztecs were full of stories relative to the old civilization, and its fabulous wealth. Father Niza was told of the ruins to the west and north, and the Pima Indians stated that these ruins were in the same state as when the Franciscan visited them at least two centuries before. Members of the Coronado expedition during the following year (1540) made a visit to a ruin on the Gila river, which is described by Castenada, the historian of that enterprise, as the "Chichilticale," or Red House—a building in ruins, the principal material of which was earth of a reddish hue. The Casa Grande ruins are usually presumed to be those referred to by Castenada; but the color is an obstacle to the acceptance of such a view, as the concrete of which its walls are composed is of a grayish hue.

The following account is given of the Gila ruins, and it clearly shows how extensive they were. This is undoubtedly the oldest description extant. "One of them is a large edifice, the principal room in the center being four stories high, and those adjoining it on its four sides, with walls two varas thick of strong *argamasa y barro*, (adobe material) so smooth on the inside that they resemble planed boards, and so polished that they shine like pueblo pottery." (Documentary History of Mexico, Serie iv, tome i, pp. 282–3.) Many other ruins were discernible for a distance of two leagues. Pieces and plates of pottery, ollas, etc., composed of fine clay, were scattered about for a long distance. The remains of a large canal for irrigating purposes were plainly to be traced from the river to the point at which it reached the plain or mesa whereon the ruined city was located. It could be followed for a distance of nine miles, encircling the city, and is stated to have been ten varas* wide.

The most distinct accounts that we have of the Casa Grande ruins are those by Fathers Kino and Mange, who explored the valleys of the Santa Cruz and of the Gila from the Sonora line to the junction of the latter with the Colorado. The manuscript has never been printed in full, and is still preserved at the Monastery Dolores in Zacatecas. The following extract is therefrom: "There was one great edifice, with the principal room in the middle of four stories, and the adjoining rooms on its four sides of three stories, with the walls ten yards in thickness, of strong mortar and clay, so smooth and shining within that they appear like burnished tables, and so polished that they shone like the earthenware of Puebla. At the distance of an arquebuse-shot, twelve other houses are to be seen, also half fallen, having thick walls and all the ceilings burnt, except in the lower room of one house, which is of round timbers, smooth and not thick, which appeared to be of cedar or savin, and over them sticks of very equal size, and a cake of mortar and hard clay, making a roof or ceiling of great ingenuity. In the environs are to be seen many other ruins and heaps of broken earth, which circumscribe it two leagues, with much broken earthenware of plates and pots of fine clay, painted of many colors, and which resemble the jars of Guadalajara, in Spain. It may be inferred that the population or city of this body politic was very large; and that it was of one government is shown by a main canal, which comes from the river by the plain, running around for the distance of three leagues, and enclosing the inhabitants in its area, being in breadth ten varas, (about twenty-eight feet) and about four (eleven feet) in depth, through which, perhaps, was directed one-half the volume of the river, in such a manner that it might serve as a defensive moat as well as to supply the wards with water and irrigate the plantations in the adjacencies."

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*A vara is very nearly 33 inches, English measure.

Father Kino, writing of the Indians, located the Pimas about where they now are, and the Maricopas north of them as far as the Salt river. He found them living in houses well-constructed and comfortable. Their villages were located on mesas near the banks of streams, and well arranged for defence. The settled portion of the country ranged from river to river—that is, from the Gila to the Salt river. The people he credited with being frugal and industrious, cultivating the land, constructing works for irrigation, building good houses with a rude concrete, and making a sort of cotton cloth from the leaf of the maguey. The better class lived in the adobe or concrete-built houses; the poorer in wattled huts or cabins, built of sticks set in the ground, and bound together at the top by ropes made from the fibrous leaf of the same plant from which material is obtained for cloth weaving. These huts were thatched with long grass, arranged in bundles. They manufactured beautiful feather work, which was also colored by them from dyes of which they had the secret. There were adepts at hieroglyphics or picture-writing. It seems probable that the Indians had learned these arts from the people who built the Casas Grande on the Gila and Salado. He also describes ruins seen by him a few miles north of the Gila, which were evidently those of a large town. The walls of several buildings then standing were at least three feet thick, and the evidence of ancient canals, etc., was plainly to be traced. These ruins are probably the same that J. R. Bartlett traced when engaged on the Boundary Commission. The Casa Grande also appears to have been visited in 1740 or 1760 by the Jesuit Father Sedalman, whose narrative has not been published entire, but the portions quoted by Humboldt enable us to understand that this adventurous priest traveled further into the Territory than any of his predecessors. He speaks vaguely, among other things, of finding a tank or reservoir formed from a depression of the land, at a point eighteen miles from the Gila river. The remains of such reservoirs, formed apparently where a lake had at some time existed, have been found by others in later days. Col. William G. Boyle, a well-known mining engineer, some three years ago, while exploring the Superstition mountains, found evidences of such works in the foothills on the western side of that range. It is unquestioned that this section was once the home of a large population. Father Sedalman's travels extended to the Rio Salado or Salt river, and down the Rio Verde as far as the present site of Camp Verde.

After Father Kino, the next explorer whose account is accessible to English readers, is that of Father Pedro Font, who, with Father Garcia, visited the Gila river, and carefully examined the Casa Grande. Mr. Bartlett, in his "Personal Narrative," quotes at length from the Father's account. This visit was made in 1775. Father Font quaintly says: "The large house or palace of Montezuma, according to the histories and meager accounts which we have from the Indians, may have been built some 500 years ago: for, as it appears, this building was erected by the Mexicans, when, during their transmigration, the Devil led them through various countries until they arrived at the promised land of Mexico; and in their sojourns, which were long, they formed towns and built edifices. The site on which this house is built is level on all sides, and at the distance of about one league* from the river Gila, and the ruins of the houses which compose this town extend more than a league towards the east and other cardinal points; and all this land is partially covered with pieces of pots, jars, plates, etc.—some common, and others painted of different colors, white, blue, red, etc., which is a sign that this has been a large town, inhabited by a distinct people from the Pimas of the river Gila, who do not know how to manufacture such earthenware. We made an exact survey of this edifice and of its situation, which we measured in the meantime with a lance, and this measure I afterwards reduced to geometrical feet, which gave a little more or less than the following result: The house forms an oblong square, facing exactly to the four cardinal points—east, west, north and south; and round about it there are ruins indicating a fence or wall which surrounded the house and other buildings; particularly in the corners, where it appears there has been some edifice like an interior castle or watch-tower; for in the angle which faces towards the south-west there stands a ruin with its divisions and an upper story. The exterior wall extends from north to south four hundred and twenty feet, and from east to west two hundred and sixty feet. The interior of the house consists of five halls, the three middle ones being of one size and the extreme ones longer. The three middle ones are twenty-six feet in length from north to south, and ten feet in breadth from east to west. The two extreme ones measure twelve feet from north to south, and thirty-eight feet from east to west."

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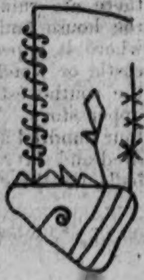
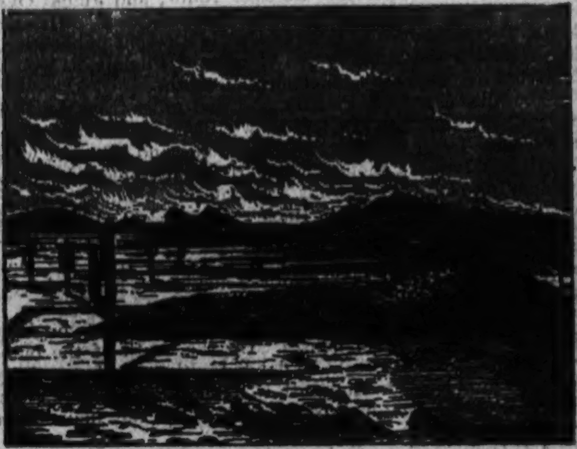
* The Casa Grande is about two leagues from the river.

Mr. Bartlett was the first American to give a description of the Gila ruins. It is possible that others had seen them, and if so they were, like the walls on which they gazed, dumb and gave no sign. He made a minute examination of these ruins, and has placed a full account thereof on record. They were crumbling as at present, one story having vanished since Father Mange said mass within the walls; and Father Font, in viewing them, decided that the devil had inspired the builders. Mr. Bartlett describes the apartments as long and narrow, and without windows. In his judgment the inner apartments were used for store-rooms. The west door was two feet wide and eight feet high. The others were three feet wide and five high. The walls at the base were worn away twelve or fourteen inches, and appeared to be held together only by their own thickness. The lintels over some of the doors and other openings were formed of sticks of wood, stripped of bark, and cut at the end by some blunt instrument. The floor beams were five inches in diameter, and the same distance apart, set in the walls opposite each other. The largest building was fifty feet north and south by forty east and west. The ground floor shows five apartments—one on each side and one in the interior. The north and south rooms measured thirty-two by ten feet. No evidence of a stairway was then or is now visible. To the south-west the remains of a second building were discernible. To the north-east was evidence of a third, somewhat like a tower in appearance, while towards the north-west was a circular embankment, from 250 to 300 feet in circumference, which Mr. Bartlett suggests was used as a corral. The interior walls were found to be plumb; the exterior taper in a curved line. All the walls are laid with large square blocks of mud, pressed into concrete, making blocks apparently two feet in height, and four in length. Two portions of the walls of a separate building were visible, which showed that it must have been three or four stories in height. The accompanying illustration represents marks he saw on the walls, which marks time has since obliterated. Mr. Bartlett also visited the ruins north of the Gila, and on Salt river at La Tempe. He crossed the Gila at the base of a



small range near the east line of the Pima reservation, and from there he passed across an extensive plain to the foot of the Superstition mountains, along the foot-hills of which he traveled until he reached the Salt river at or near Marysville. An extensive plain lies between the two rivers, formed by their junction, at least thirty miles across on the east, and but four or five at its western extremity. The evidence still remaining is ample to show that it must have once been thickly inhabited. Mr. Bartlett found ruins the entire distance, in the shape of ancient canals, small mounds, and broken pottery. Several mounds were found on the Salt river, measuring from 80 feet wide to 120 feet long. One of these is plainly discernible, as our illustration shows, from the stage road at La Tempe. On the other side of the river two mounds larger in size are to be seen—one near Hayden's mill, and the other close to East Phœnix. Mr. Bartlett, as well as other explorers, calls attention to the fact that the pieces of pottery so widely scattered show that the vessels were all painted or glazed white inside—an art which the Pima and other Indians do not possess. The La Tempe mound was measured by him, and found to be from 200 to 225 feet long by from 60 to 80 wide. This would give



THE MOUNDS AT LA TEMPE.

a much larger edifice than the Casa Grande. It is true to the cardinal points of the compass—a peculiarity common to all these ruins and mounds. Father Sedalman also describes the La Tempe mound, and gave an account, too, of a three-storied building or ruin there, which he found at the junction of the Gila and Salt rivers. Major (now Gen.) Emory, in his report of explorations, gives an account of ruins in the Salt river valley, which were described to him as being rather large, unroofed and crumbling, the material being concrete or cojon, with glazed walls, on one of which was the distinct remains of a man's foot. A large canal is still to be traced; and, indeed, the stage from Florence to Phœnix runs through it for some distance. Mr. Moore, now of Maricopa Wells, describes five mounds as on or near the Bartlett route; and Judge Oury tells of a large canal running across the west side, or heel, of the La Tempe plain. Colonel Hodge, in a recent publication,* thus describes the ruins in the vicinity of Phœnix, as well as the irrigation works in connection therewith.

"Six miles east from Phœnix, and two miles from the Hellings mill, are the ruins of a large town, near the center of which is one very large building, 275 feet long, and 130 feet wide. The debris forms a mound which rises thirty feet above the surrounding plain. The walls are standing about ten feet in height, and are fully six feet thick. There seem to have been several cross walls, and the whole was surrounded by an outer wall, which on the south side was thirty feet from the main wall; on the east, sixty feet; on the north, one hundred feet; and on the west side, sixty feet.

"On the north, and at the north-west corner, were two wings, perhaps guard or watch houses. On the south of the outer wall was a moat, that could be flooded with water from a large reservoir fifty yards to the south. Several other large reservoirs are at different points in and around the main town, which was over two miles in extent.

"A large irrigating canal runs to the south of the large building, which was from twenty-five to fifty feet wide. This canal took the water from Salt river eight miles above, and can be easily traced for twenty miles or more below. The people who excavated these canals must have had a knowledge of engineering, as they are cut on a true and perfect grade. Several engineers who have surveyed canals for irrigation along the line of the old ones, acknowledge that they cannot improve the grade, or gain an inch of grade to the mile. The largest of the old irrigating canals is some twenty-five miles above Phœnix, on the south side of Salt river, near the point where the river emerges from the mountains. This one, for eight miles after leaving the river, is fully fifty feet wide. For this distance it runs in a south-west course through hard, stony ground, and enters on a vast stretch of mesa or table-land, which extends south and south-west from thirty to sixty miles, having an elevation above the river of nearly one hundred feet.

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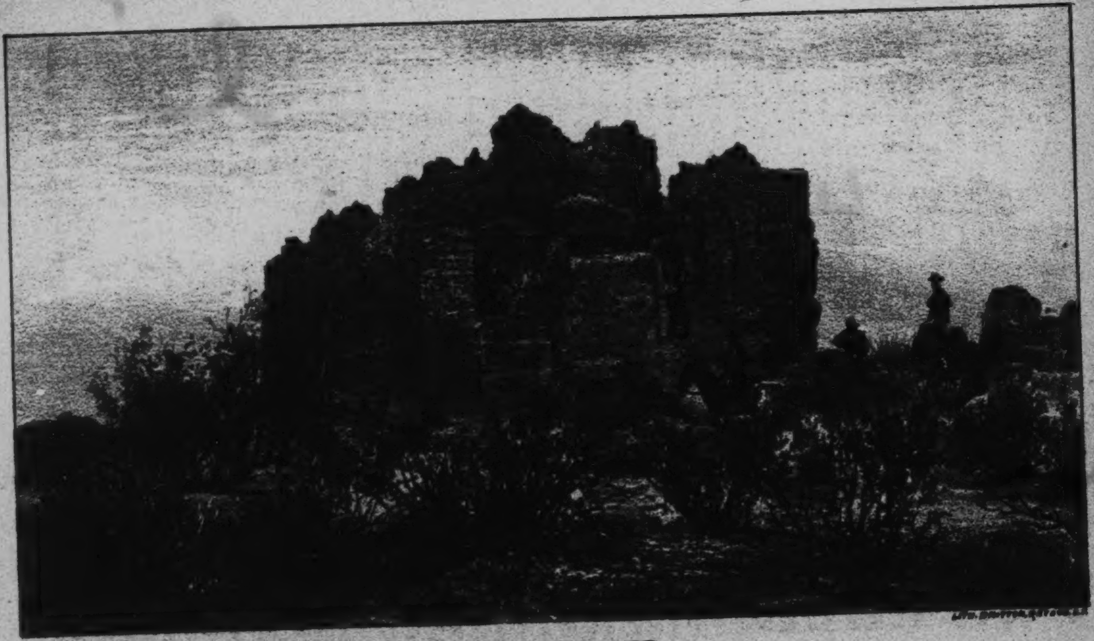
* "Arizona as It Is."

"At about eight miles from where this great canal leaves the river, it is divided into three branches, each twenty-five feet wide, one of which runs an east-of-south course, one nearly south, and the third south-west, the three probably carrying water sufficient to irrigate the whole of the immense plateau before mentioned. Two miles west of where the main canal branches are the ruins of a large town, which extends along the mesa for many miles. Near the center of this town are the ruins of the largest building yet discovered. Its ground measurement is 350 feet by 150 feet, with outer walls, moats, embankments, and reservoirs outside the main walls, and ruins of smaller buildings in all directions. On the line of the branch canals, distant many miles from this one, are other ruins of towns similar to the others described. Below the great canal and the large ruins described, extending through what is called the Tempe Settlement, are other irrigating canals of nearly equal size to the others, and which were taken out of the river many miles below the large one mentioned; and along these are also the ruins of great houses and towns."

Mr. Johnston, who was associated with the Emory explorations, gives extended details of discoveries made. In addition to a description of the Casa Grande, similar to Bartlett's, Johnston describes a terrace 300 by 200 feet, and five feet high, which he traced, and on which he believed there was evidence of a pyramidal structure at least eight feet high having been erected. The summit of the pyramid made a platform about seventy-five feet square. This was in marked contrast with the other ruins. No trace of it is now discernible, unless it be in the three large mounds several hundred feet to the north of the Casa Grande itself. He also found west of and near a Pima village traces of a large circular enclosure, and what he termed a mound. There is one still to be seen near the stage road, and within gunshot of the Casa Blanca trading post. It measured about 90 by 100 feet. On the east side, according to Johnston, (1852–3) was a low terrace, of 60 by 300 feet in extent. Basalt stones, concrete heaps, and broken pottery were to be traced for some distance. Father Sedalman described a ruin thirty-six miles below the Casa Grande, on the same side of the Gila.

To complete, as far as possible, this account of the Gila valley ruins, and especially the principal one, now known as the Casa Grande, the following description of a very recent visit is given. The party consisted of Dr. H. R. Allen, of Indianapolis, F. H. Steel, of Oil City, Alexander Whilden and J. K. Wallace, of Philadelphia, Cols. C. W. Tozier and J. D. Graham, of San Francisco, J. E. Conklin, of New York, Col. William G. Boyle, a well known mining engineer, and the present writer. Mr. Conklin, who is an artist and journalist, having with him a field apparatus, took some excellent stereoscopic views of the ruins. The visit was made December 13th, 1877, and several hours were devoted to the examination. The ruin stands, a bold and striking object, on the highest swell of a great plain extending to the horizon line on every side for many miles. To the north, seven or eight miles, the eye rests on a bold but not high mountain range, while to the south-west are to be seen the serrated sides and rugged outlines of the Sacatone. Far off to the south the vision's ken failed in reaching more than the haziest outlines of high, bold ranges, which the old explorers of the party announced as being in Sonora, 80 to 100 miles away. The plain is covered for two or three miles with a light soil, which it is obvious differs from all about it, and bears on its surface the evidence of being largely made by debris and drift from the ruins. The plain is covered by mesquite trees and a full growth of light underbrush. But few cacti are to be seen. Turning from the main road at Montezuma station, on the Gila, a drive of two miles brought the party in sight of the bold, bald walls, gray and massive, of the ancient structure that remains to tell us of the whilom existence of a people whose character and belongings are lost in the mists of the long-ago, and of whom even tradition bears no record. All traces of their existence would be lost but for this ruin, and a comparatively few mounds which are still traced elsewhere in this Territory. It is a difficult thing to realize that in this country, where the supply of water appears to be so limited and the desolation so complete, that there could have once lived a numerous, and it is very evident a thrifty and thriving population.

The Casa Grande itself is the remains of a large building, the walls of which are composed of a species of gray concrete or



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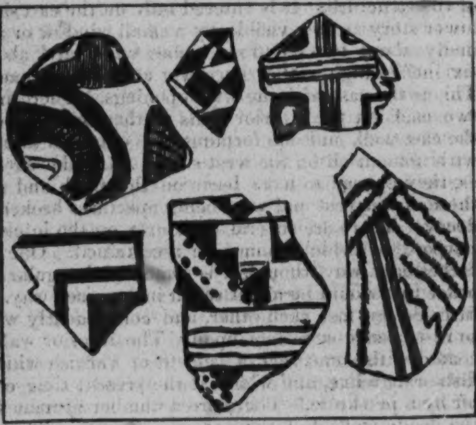
CASA GRANDE
Gila Valley

groat. They still stand in a crumbling and almost disjointed condition, for a height of from thirty to forty-five feet, the inside wall being the highest. The exterior walls at their thickest part are four feet six inches thick. The interior walls at different points are well preserved, and show a uniform thickness of nearly four feet. At the north-east corner there is a great rent, and the walls are entirely separated; the opening here is about five feet and occupies the whole of that angle. In the center of each side there are crumbled, out-of-shape openings, which on the north and west sides indicate old doors or entrances, but on the other sides appear to have resulted from the crumbling away of the walls. The interior shows a length of fifty-two feet north and south, and a width of thirty-six feet six inches east and west, while the exterior walls show in the same way a length of sixty-one by forty-five feet six inches. Of course the exterior walls are much worn, furrowed and crumbled. In all probability they were originally not less than six feet thick. The interior walls still show above the debris traces of three stories, rows of small round holes indicating where the rafter poles had rested. In one room on the west side we were able to count them, and found twenty-eight holes each side of the apartment, showing an average of six inches apart, with holes of four inches and a half diameter. The interior room or compartment is the best-preserved part of the structure. It is entered only on the east side and on the lower story as now visible, by a small window or aperture originally about two feet four inches wide, and about four feet six inches high, rather narrower at the top than at the base. This is the case with the other openings. There are six in all—two each on the interior walls to the north and south, one on the east wall, and one forming the entrance to middle rooms, with none at all on the west side. As to the exterior entrances, they appear to have been on the north and south fronts; those on the east and west being apertures broken by time and decay. There are several apertures on the interior walls, the purpose of which cannot be ascertained. One is about ten inches each way, though it is somewhat irregular in form; the other two would be about seven inches each way. These apertures do not face each other, and consequently were not used to rest beams or rafters upon. The interior walls have been coated with some sort of cement or varnish which has a reddish-orange hue, and which at the present time can be peeled off by a pen-knife. There are a number of names scrawled on the inside walls, but none of special note. The accumulated debris almost forms a mound on the exterior, while inside the floor is very uneven. The interior room gives out a hollow sound. Outside the rains and winds are rapidly undermining the base of the walls; unless something be soon done to roof the structure and prop the walls, the Gila Casa Grande will be altogether a thing of the past.

Tracing the exterior evidences of this enclosure, as well as other buildings, there were found immediately to the east, about sixty feet, the remains of a smaller building, a fragment of whose walls, from eight to ten feet, is still standing. To the south there is evidence of another, of which nothing remains but a part of the ground plan. From the north-east corner of the Casa Grande itself there is a distinct mound of debris, forming apparently the walls of another part of the same building, and continuing for about forty or fifty feet; it then makes an angle on the north towards the west for about half the distance, beyond which it is not now traceable. There is plain evidence of an enclosing wall to be seen, and with the recollection of Kino's, Font's and Bartlett's descriptions in mind, it is not at all difficult to show that there must have been a larger structure here than is now seen, embraced within a wall of about 450 feet by 300. Towards the west the ground is clear for a considerable space. On the east side, at from 400 to 600 feet, there are several large mounds covered by pieces of pottery. One of them still shows the corner of a wall, made of the same material as the main building. To the north thereof were found four very large mounds, two of which must be nearly thirty feet high. Three of them on the north



ANCIENT POTTERY.

stand almost escalading each other; and the fourth, some distance to the west, stands lengthwise to the others. The ground is everywhere covered by small pieces of pottery such as are shown by the illustrations. The only thing found of a special character was a piece of fire-brick, or some other material, used to line a furnace with. Beyond the facts given nothing was seen likely to elucidate the mystery which broods in silence over these remains. The party, after holding a meeting, and adopting resolutions urging the formation of an archæological society for Arizona, of which they offered to become members, raised a small American flag on the wall, took luncheon in the ruins, and went on their way to Tucson. One of the party pointed out the direction in which the great canal came from the Gila, and by means of which the whole vast plain, now crowned only by the desolate casa, and its adjacent mounds, was once the seat of a large and industrious population. The point at which the Gila water was drawn was above Florence, and distant from the Casa Grande about forty miles.

Other proofs of extensive ruins are found in Arizona—on the Rio Verde, the Colorado-Chiquito, the Rio Francisco, in the vicinity of Prescott, and all along the streams which penetrate the great plateau. Recent discoveries in the Globe district and elsewhere also extend the area of these ruins. Mr. Leroux, guide to the Boundary Commission, describes ruins that he visited in 1854 in the Rio Verde valley, of solid masonry, twenty feet one way by fifty to seventy-five feet another, two stories in height, and with walls three feet thick. Evidences of a town ten miles from the nearest water, with canals, were seen. Lieutenant Whipple in 1854 found on Pueblo creek traces of two fortifications, and one separate—an irregular stone enclosure on the top of a hill, three to four feet high, the exterior walls being from eight to ten feet thick, and divided into compartments by interior walls five feet thick. Adobe ruins and broken pottery were traceable near by. At a fertile place on a fork of the creek a square enclosure was also traced, with walls six feet thick and five paces in the clear. At Aztec Pass, eight miles to the west, was another, commanding the pass. It was 100 feet by 25; the walls, four feet thick and five high, were built of rough stones, embedded in mortar.

Major Emory found on the San Pedro, where it joins the Gila, fifty miles east of the Casa Grande, a large area of ruins located in the valley wherever the mountains were not too close to the river. He estimated that there must have been a population of 100,000 persons there at one time. These remains consist chiefly of long lines of rough amygdaloid stones, made round by attrition. Adobe walls were apparently built on these foundations. The plans were generally rectangular in form.

Another enclosure was found on the Santo Domingo, a branch of the Gila further east, with a number of faces to each point of the compass of from ten to thirty feet apart, the enclosure being twice as long north and south as east and west.

There was found an enclosed circle, also, having a circumference of four hundred yards. Another, of ninety feet diameter, had the remains of a house in the center. The Pimas reported at the time the existence of a labyrinth further to the west. Emory and Johnston report finding traces in all of twelve towns, on the Gila, west of the San Pedro's junction.

A writer in the New York *Tribune* is referred to in the "Historical Magazine," vol. 10, supplement, page 75, as having discovered a pyramid on the Colorado, in Arizona, the base of which was 104 feet square. Its height is stated at twenty feet, when seen originally; the stones were pointed and hewn in blocks twenty-eight to thirty-six inches thick. Old ruins are talked of as having been seen fifty miles above Ehrenberg. No verification of these statements has been traced, and if they really exist, it is the only ruin of note yet heard of in the region lying between the Colorado and the Painted Rocks on the Gila, to the south, north thereof to Bill Williams Fork, or west of the Salt river and the mountains about Prescott. The evidences at Bill Williams consist of walls, still six feet in height, and traceable for a circumference of 800 feet; also cave dwellings and cliff pictures. Coming to the east of the region indicated as bare of antiquities, the following is condensed from "Arizona as It Is," the author of which traveled extensively through the Territory and closely examined its prehistoric remains. He says: "Some twenty miles south from Prescott, and two miles north from Walnut Grove, is a mountain top with a walled inclosure of about two acres. The wall surrounding this inclosure is in places ten feet thick, and ten to fifteen feet in height. Inside this wall are the ruins of fourteen old stone houses. Six miles south-east, on the east side of Milk Creek, is another mountain top, 3,000 feet above the little valley below, and on this summit there is also a walled inclosure, containing about five acres. The wall is very heavy and high, and inside it are the ruins of twenty-four stone buildings from twenty to thirty feet square. The ruins of a stone causeway, leading from a south spur of the mountain to the main summit, can be traced for fifty yards. It is twelve feet wide, built on the sides with bowlders of a ton in weight, between which were filled in smaller stones and earth."

"Several miles up the Hassayampa Creek from Walnut Grove, and some eight or ten miles south from Prescott, are many ruins of stone houses, some on the high hills bordering the Hassayampa, and some in the valleys near the creek; some of those in the valleys near the creek are surrounded by large pine forests, and inside the walls of one of the ruins were three large pine trees of hundreds of years of growth."

"In Chino Valley, twenty miles north from Prescott, are some interesting ruins, well worthy a visit and thorough examination. The ruins extend for a long distance in and around the valley, there being a series of nearly a score in sight from almost any point in the valley. The springs which water the valley were long since used for irrigation, there being yet evidences of them to be seen. On one of the farms there is a series of ruins of stone houses, five in number, surrounded by a stone wall. The earth has accumulated around the wall and houses to a depth of several feet since their destruction, which was evidently the work of an enemy."

"One of these buildings has been excavated to a depth of five feet below the surface. The inner walls of the room were found to have been plastered, and the exterior walls were partly of concrete and partly of stone. On the west side were found a number of large ollas,* filled with what was evidently burned or charred beans and corn. Near the south-east corner were found portions of three skeletons, one of a large man, one apparently of a woman, and the other of a child, and near them a water olla. A number of stone axes and hammers were found in excavating this room. The stone of which the wall and buildings were made was trachyte, and must have been brought from a volcanic mesa, about one mile to the west, where they are abundant. One mile north is a very large stone building on the summit of a hill, which was probably a temple or a fortress, also built of stone, and the stones were square dressed. In a cañon yet a little further north are a few small cave dwellings of considerable interest, but very difficult of approach."

"Four miles below the place described, there is a hill overlooking the Verde river, with a series of ruins of stone houses, inclosed by a stone wall on the south side, which in places is twenty feet high, and twelve feet wide. The other sides of the hill are abrupt and precipitous, and two to three hundred feet perpendicular. Three miles further to the east is one of the highest mountain peaks of the country, and its summit is inclosed by three tiers of stone wall, a few hundred feet apart. Old stone ruins of an extensive character crown its summit. To the east of Prescott eighteen miles, in the Agua Fria valley, there are the remains of a very large stone building, which was one hundred and sixty feet square. From the debris of this building, a large double stone house, one smaller one, and much stone wall have been erected, and there yet remains on one side a pile of debris four or five feet in height. On the hills around are many other old stone ruins, as well as on the summits of high mountains in every direction, and for long distances."

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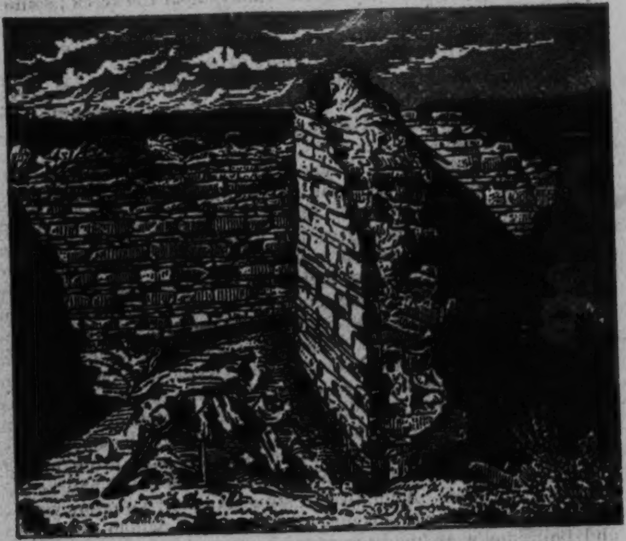
*A large earthen vessel, pronounced o-ya.



RIO VERDE RUINS.

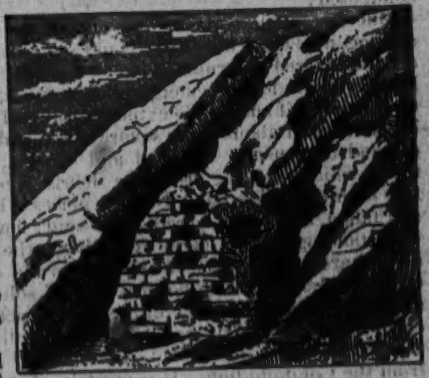
"In the Verde valley, forty miles east from Prescott, and extending up and down that valley for long distances, are scores of stone ruins similar to those heretofore described. They are found also in all the contiguous valleys of Beaver, Oak, and other creeks, on the hills and the mountain summits, as elsewhere. Opposite Camp Verde, a short half mile on the eastern side of the river, are many large stone ruins on the bluffs overlooking the river, the walls of which are standing twenty to thirty feet high, and immense quantities of broken pottery are strewn freely over the ground. Two miles down the river, and a half mile east of it, on a stretch of table land elevated above the river bottom 100 feet or more—what is supposed to have been an ancient burying ground has been found. It covers nearly one hundred acres of ground. The graves were inclosed by stones placed in an oblong circular form, from two to six feet in diameter.

"Beaver Creek enters the Verde river a half mile above Camp Verde, coming in from the north-east. This section of country is a limestone region, in which are some of the most interesting cave dwellings to be found in Arizona. Beaver Creek is hemmed in much of the distance for many miles by abrupt, perpendicular bluffs of limestone, in which are many interesting old cave dwellings. They are mostly walled up in front, and at a distance look like the natural stony bluffs. In two of these cañons, some six miles up the creek on the north side, are several caves some twenty feet above the creek, in two of which are perfect cisterns, made of cement, and almost as hard as marble, and as perfect as when made. On one of them are prints of the hands of their makers, indented in the cement while in a plastic state, and also the print of the tiny hands of a small child, no doubt made by the little one in childish glee and play. Three miles below these caves are numerous others in a high bluff on the north side of the creek. This bluff is nearly or quite 400 feet high, and is almost perpendicular.

"The largest of the caves is ninety feet across in front, walled up to its very top, a distance of over fifty feet, and difficult and dangerous to enter, as the opening is nearly 100 feet above the base of the cliff. The debris from the cave is piled up against the foot of the perpendicular wall rock for nearly 100 feet, from which point explorers must climb the face of the vertical wall rock nearly the same distance to reach the opening to the cave. This must be done by clinging to poles and jutting points of rock, and occasionally obtaining an insecure foot-hold but a few inches wide. When once in the cave, it is found to be divided into many rooms. The extreme height is fifty to seventy-five feet, as near as one can judge. The wall in front is laid in mortar, or cement, and near its uppermost part are two port holes, from whence the dwellers within could obtain a view of the country for a great distance around. But few whites have ever succeeded in exploring this cave, and it took us several hours to accomplish the feat in safety. When first explored, there were found in it a few stone axes, metates, and other stone implements."

At Camp McDowell, or near it, old residents of the Territory report the remains of a considerable fortification, and of the largest acequia yet found. It is traceable along the foothills of the two encircling mountains. At this point some excavations were made and bones were found; among them nearly a perfect skeleton. From the thigh bone the post surgeon at the time declared the man must have been nearly or quite seven feet high. Children's bones were also found. Stone tools were collected, among them being one of slate, very sharp, and in the shape of a cleaver. In Mojave county there are rude ruins to be traced, and similar ones are also to be found in the north-west portion of Yavapai. The valleys of Williamson and Walnut, Mount Hope, Camp Hualapai, Cerbat, and other points show detached villages. It is to be remarked that as the the observer traces these remains towards the Colorado cañons, they become ruder in aspect, more segregated in location and position, until at last they descend to the level of the cliff and cave houses and dwelling, as they have been in part traced by the Ives and Powell explorations, especially the latter.

The vicinity of Prescott for sixty or seventy miles in all directions but the west, is marked by these ancient ruins. The walls of stone and concrete houses are visible. The elevated and defensible positions are all occupied by rude fortifications, and the interval on which Prescott itself is built has evidently been one of their centers. After leaving the Salt river and traveling north, there is a change in the character of the materials used. Stone, rather than concrete and adobe, is found in walls, and there is a decided tendency to utilizing the cliffs and other inaccessible (to an assailant) positions. This would indicate quite clearly that the inhabitants were in peril and under stress of defence. The works and remains also grow smaller. Lieutenant Wheeler's report describes some remains in the vicinity of the Sierra Prieta, which illustrate this suggestion. The report says: "Circular mounds and stones occupy many of the little knolls and heights along the streams, and wherever they exist numberless fragments of earthenware and glazed pottery are thickly strewn over the surface, proved by cedar trees on the spot to be not less than two hundred years old. Placer miners believe that the gold ground has been washed over." The Colorado-Chiquito valley appears, evidently, to have been a prominent center of prehistoric activity.



ANCIENT RUINS NEAR THE COLORADO-CHIQUITO.

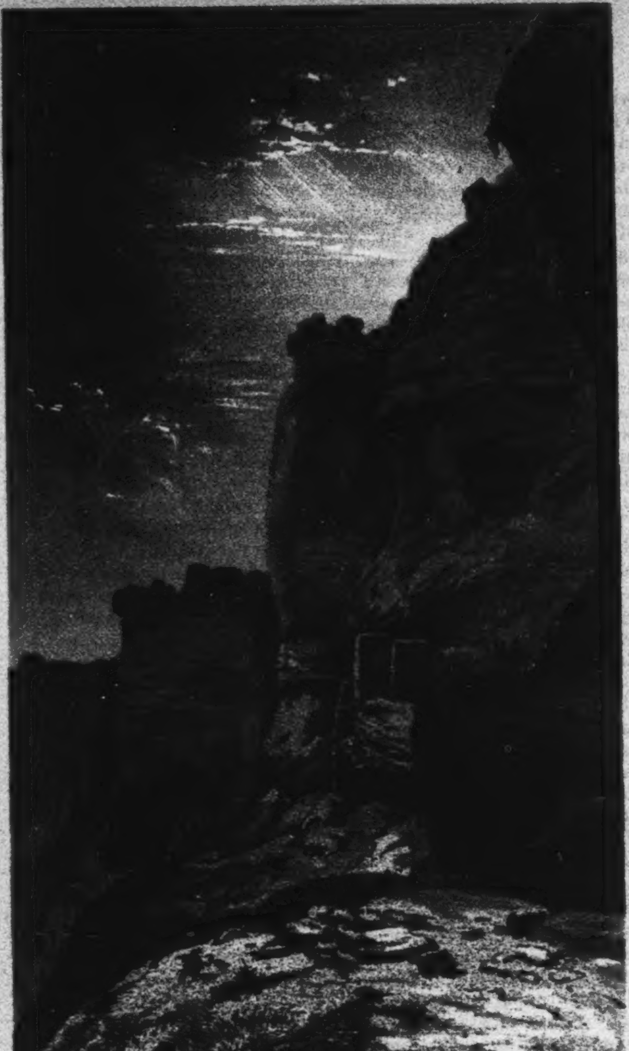
There is but little evidence of the habits of the ancient people, as to religion, etc., on which to form a reasonable theory; but one notable thing is apparent, and that is, that they were cremationists as to the disposal of their dead.

There are some slight proofs in signs and hieroglyphics of sun and planet worship, and one authentic case has been found of a granite cup or vessel with the male Priapian symbols for a handle. There is a general belief among intelligent observers that mining as well as agriculture was one of their pursuits. No positive evidence of ancient mines has been found. A curious shaft was discovered two years since in Mojave county. In the Globe district some workings, or rather their traces, have been discovered, and ruins of fortifications near by would indicate a large number of persons as having been engaged. But it is quite as probable that these were the work of adventurous Spaniards, as of the prehistoric people.

Turning to the evidences of the area embraced by this ancient civilization, the following, showing the related character of the ruins adjacent to Arizona, or in portions of the Territory not much explored or known, will prove of the greatest interest: In September, 1872, a party of prospectors, under command of Col. Roberts, of San Francisco, started on an exploration of portions of Colorado, Utah, and Arizona. They took the field at Denver, Colorado, and traveled south to Pueblo, thence diverging to the south-west. After exploring the

San Juan valley, in Colorado, the Roberts party plunged into the desert, getting entangled in a maze of stony mesa, cañon, gorges, and arid mountain plateaux. For several days they were lost, and only extricated themselves after considerable suffering. Col. Roberts gave a graphic account of the journey in the San Francisco *Chronicle*, from which the following is condensed:

One day, while traveling up one of the impassable gorges, seeking a place where they could scale its craggy sides, Roberts discovered the ruins of what was once a large and populous city. Suddenly emerging on a mesa, he was amazed at finding himself among the extended ruins of a great city, covering an area of about three square miles, and enclosed by a wall of sandstone neatly quarried and dressed, ten or twelve feet thick, which, judging from the debris, was fifteen or twenty feet high before its fall. In most places it had crumbled away and fallen, and was covered with sand; but in many places it was standing six or eight feet above the banks which had drifted around it. The entire area inside of this had at one time been covered with houses, built of solid sandstone, which showed excellent masonry in their construction. This ancient city is situated in Arizona, about ninety miles from the boundary line between Utah and Arizona, and the same distance from the Colorado line. It is entirely of stone, and not a stick of worked timber is to be seen among the ruins. Nothing but the walls are standing, and none of them are now left more than eight or ten feet above the sand, which is eight or ten feet deep. Colonel Roberts estimated that there were at least 20,000 houses in the city. It was laid out in plazas, with paths or small streets from one to the other. There was evidently one main highway extending through the center of the city. This has been cut down by the winter torrents into a yawning chasm, 600 or 800 feet deep, and 800 feet wide. The walls still bear traces of many hieroglyphics cut deep into them. There are also the ruins of stately monuments, built of square block sandstone, well quarried, and showing good masonry, which are worked with notches and crosses cut into them at regular intervals. The remains of a canal to the hills, fourteen miles distant, were discovered, from which it is inferred that the country was at one time well watered and fertile, but finally became dry, when the inhabitants were driven from the city by drought. With the exception of broken pieces of pottery, no relics were found; but these pieces were remarkable, and concerning them Colonel Roberts says: "These were embellished



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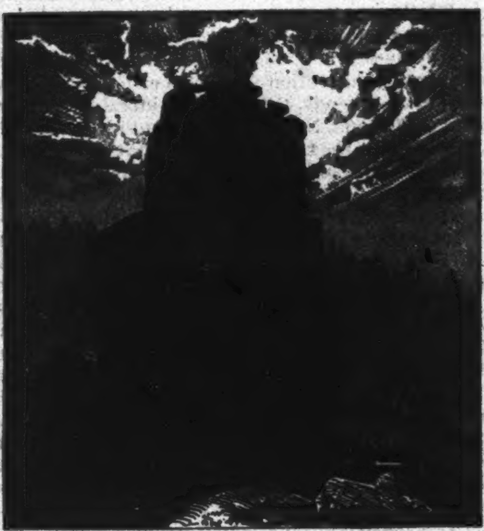
ANCIENT CLIFF HOUSE.

with paintings of flowers and ornamental figures in blue colors. The coloring matter is of a blue mineral substance of some kind, which the chemist at Santa Fé, to whom some of the pottery was shown, could not clearly define. It is perfectly indelible, and pieces of the pottery which have been exposed to storms which have worn away the solid masonry of the walls of the city, show the colors fresh and bright to all appearance as when new. The pottery itself has been found to be perfectly fire-proof upon trial in crucibles and furnaces, and if the secret of its manufacture could be discovered, it would be worth millions of dollars to the possessor, and the material invaluable for the lining of safes and similar purposes."

There are several notable points in relation to this reputed discovery to which attention should be called. So far as present investigation extends, no very considerable remains have been found in Arizona, New Mexico or south-western Colorado; such, for instance, as the Casa Grande on the Gila, Salt river, and Rio Verde ruins; at any great distance from a stream. Those in Colorado are also close to or in the valleys of small rivers. There are some reasons for doubting the correctness of Col. Roberts' location; and one is that the extreme north-east corner of Arizona is occupied by the Navajo reservation, on which it is not probable any ruins of such extent can be or have been found. That Col. Roberts found extensive ruins is hardly to be doubted; but it would seem as if he might be mistaken in the location. Dr. Newberry gives, in a report on the geology of the Uintah mountains and the route thereto, a description of similar ruins. The Doctor says: "Some two miles below the head of Labyrinth cañon we came upon the ruins of a large number of houses of stone, evidently built by Pueblo Indians, as they are similar to those on the Dolores, and the pottery scattered about is identical with that before found in so many places. It is very old, but of excellent quality, made of red clay coated with white, and handsomely figured. Here the houses are built in the sides of the cliffs. A mile or two below we saw others crowning the inaccessible summits—inaccessible except by ladders—of picturesque detached buttes of red sandstone, which rise to the height of 150 feet above the bottom of the cañon. Similar buildings were found lower down, and broken pottery was picked up upon the summits of the cliffs overhanging Grand river: evidences that these dreadful cañons were once the homes of families belonging to that great people formerly spread over all this region, now so utterly sterile, solitary and desolate."

The large number of ruins found in the San Juan valley and its cañons in south-western Colorado, have been made known by the expedition of Prof. Hayden and the United States geological survey under his charge. The perfect details that are given enable one to place the Arizona ruins in the same category, as the following extracts from extended descriptions will establish: "Entering the cañon at its upper end, grouped along in clusters and singly, were indications of former habitations very nearly obliterated. Among them one building was found of square and carefully-laid sandstone; one face only exposed, of three or four courses above the mass of debris which covered everything. This building lay within a few yards of the bank of the stream, was apparently about ten feet by eight; the usual size, as near as could be determined, of nearly all the separate rooms or houses in the larger blocks, there being no houses larger, and many not more than five feet square. The stones exposed were each about seven by twelve inches square and four inches thick, those in their original po-


ANCIENT WATCH-TOWER.

sition retaining correct angles, but when thrown down worn away and rounded by attrition to shapeless bowlders. Being so exposed to the elements, the cementing material which bound the masonry together was entirely worn away upon the surface, but upon tearing away a few courses it was found binding the rocks together quite firmly. It was not, however, anything more than clay cement. Further up the cañon, ruins were found on all sides, the great majority consisting of heaps of debris, with always a central mass considerably higher and more massive than the surrounding lines of subdivided squares. Square buildings, not more than eight feet square, were often found standing alone, apparently, no trace of any other being detected in the immediate neighborhood." The following description of a watch-tower and rock houses from the same region will answer for those at the Moqui towns, an illustration of which is given here: "Upon a hugh block of sandstone rolled down from the escarpment of the mesa above, and lodging upon the very brink of a bench of rock, midway between top and bottom, the tower was built, and ages ago served as the outpost of a prosperous settlement of a now wholly forgotten people. At places where the trail ran high up, near the more precipitous portion of the bluff, remnants were found of stone walls, inclosing spaces of from five to twelve feet in length in the cave-like crevices running along the seams of the rocks. They were pretty well demolished, —the stones undressed and imbedded in mud and mortar. In many places little niches or crevices in rock had been walled up into cupboard-like places of about the size of a bushel basket. Some miles still deeper into the cañon brought about fresh and even more startling disclosures, and one little house in particular, at the extremity of a ledge fully eight hundred, if not more, feet from the base of the bluff, caused the greatest amazement at the temerity of the builders. Directly below the house was a nearly perpendicular ascent of fully one hundred feet, which for a while was a puzzle, but finally it was surmounted by finding cracks and crevices into which fingers and toes could be inserted. From this, little ledges were occasionally found, and by stepping shoulder above shoulder and grasping tufts of bushes, these ledges, one after the other, were surmounted, and in time a slope, smooth and steep, was reached. Into this slope there had been cut a series of steps, now weathered away into a series of undulating hummocks, by which it was easy to ascend, and without them almost an utter impossibility. The perpendiculars of the house were found to be well regarded and the angles carefully squared. About the corners and windows considerable care and judgment were evident in the overlapping of the joints so that all were firmly held together. All the interstices between the stones were nicely chinked in with small chips of the same material. Most peculiar, however, in the dressing of the walls of the interior, was the thin layer of firm adobe cement, colored to a deep maroon red, with a dingy white band, eight inches in breadth, running around floor, sides and ceiling. Ruins of a half dozen other houses were found on lower ledges, some crushed by the overhanging wall falling upon them, and others had lost their foothold and had tumbled down the precipice.

The Casa Grande, as well as the ruins of Rio Verde, Chaco, Cañon Chelly, and other points, show the same rectangular form, and are all located true to the points of the compass, as in the case of the Colorado ruins, models of which are now in Washington, and were exhibited at the Philadelphia Exposition. Lieutenant C. C. Morrison, Sixth Cavalry, who was with Lieutenant Wheeler's Expedition, describes as follows some ruins found in the Chaco Valley, close to the eastern line of Arizona, whose characteristics seem so well defined as to be worthy a place here: "Its southern and western walls are still standing, showing in its present state at least four stories; the outlines of 103 rooms are easily traced on the ground floor. The walls on the east, south, and west sides have been at right angles to each other; that on the northern front facing the water has been an arch, with three large towers built so as to defile all the ground between the building and the stream. In the interior has been a court with several circular rooms, like the present *estufas* or assembly-rooms of the Pueblo Indians of New Mexico. The whole structure is of stone and wood; no evidence of iron is found. The masonry consists of thin plates of sandstone, dressed on the edges, laid in a coarse mortar, now nearly as hard as the stone itself. Every chink is filled. The usual stone is from half inch to an inch thick, with occasional layers of stone two or three inches thick occurring regularly every fifteen to eighteen inches interval, evidently to strengthen the masonry. The exterior face of the walls is as smooth as one built of brick and beautifully plumbed. At the base, two and a half feet through, the wall at each story decreases in thickness by the width of a slight beam, on which rest the girders of the floor, the larger ones setting in the wall. There are no doors opening on the side away from the court, and the only means of light seem to have been through the inner rooms and through some small port-holes opening outward on the stories above the first. There are no perfect arches found in the building; the only approach to such being in having the successive layers over the windows extend one beyond the other till one stone can span the space. Usually the doors and windows were capped by lintels of wood, which were but slight round poles, with their ends, as were those of all the girders, hammered off, apparently by some stone implement. In one of the circular rooms was found what appeared to be an altar, built out from the side of the wall in the very center of the building; it was probably here that their worship, since lost or perpetuated in an altered form by the present Pueblos, was carried on.

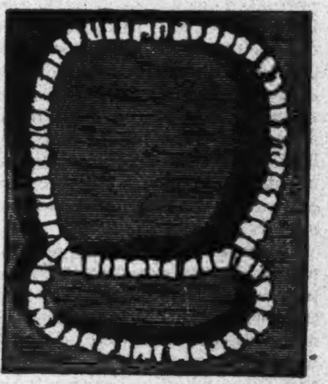
"The most striking peculiarities of the buildings were the wonderfully perfect angles of the walls, the care with which each stone had been placed, the perfection of the circular rooms as to their cross section, and the great preservation of the wood. With an architecture so advanced in other respects, their glaring inability to tie joints in corners, each wall being built up against and not united with the others, makes it comparatively weak; indeed, it is to be wondered at that the walls are still standing, depending as they do each upon its own base, without abutments."

Major Powell, in his interesting papers on the Province of Tusayan, (the Moqui towns) published in *Scribner's Monthly*, (1876) describes and comments on some buildings he found therein, as follows: "Only the foundations were left, but irregular blocks, of which the houses were constructed, were scattered about. In one room I found an old mealing-stone, deeply worn, as if it had been much used. A great deal of pottery was strewn about, and old trails were seen, which, in some places, were deeply worn into the rock. To the west of Oraybe, one of the towns in the province of Tusayan, in northern Arizona, the inhabitants have actually built little terraces along the face of the cliff, where a spring gushes out, and there made their site for gardens. It is possible that the ancient inhabitants of this place made their agricultural lands in the same way. But why should they seek such spots? Surely the country was not so crowded with population as to demand the utilization of a region like this. The only solution which suggests itself is this: We know that for a century or two after the settlement of Mexico, many expeditions were sent into the country now comprised in Arizona and New Mexico, for the purpose of bringing the town-building people under the dominion of the Spanish Government. Many of their villages were destroyed, and the inhabitants fled to regions at that time unknown, and there are traditions among the people who now inhabit the pueblos which still remain, that the cañons were these unknown lands. It may be that these buildings were erected at that time. Sure it is that they had a much more modern appearance than the ruins scattered over Nevada, Utah, Colorado, Arizona, and New Mexico."

The foregoing serves to strengthen a theory which has grown up during the preparation of this work, and which will be found presented elsewhere, as to the retreat of these people northward from the Gila. Elsewhere Powell thus describes other evidences of life: "On a terrace of trap we discovered another group of ruins. Evidently, there was once quite a village here. Again we found mealing-stones and much broken pottery, and upon a little natural shelf in the rock, back of the ruins, we found a globular basket that would hold, perhaps, a third of a bushel. It was badly broken, and as I attempted to take it up, it fell to pieces. There were many beautiful flint chips scattered about, as if this had been the home of an old arrow-maker."

From the facts thus presented it appears that within the area principally embraced east and west by the 108th and 113th parellels of latitude and the 38th and 33rd degrees of longitude will be found the evidences of a prehistoric civilization quite distinct from that of the Aztec, which has perished utterly from the face of the earth, leaving behind it only the proof that those who lived within it built towns and cultivated the land. Nothing else is known with any certainty, except that that they used stone tools and made pottery of a fine character. The area embraced forms an irregular triangle whose southern base is the Gila Valley. Below it for a great stretch there are no ruins, and only one ruin remains, (in Chihuahua) to indicate that the people who built the Gila Casa Grande had any location south thereof. The eastern line would be covered by about 107 deg. 30 min., as our hypothesis excludes the New Mexico Pueblos, except the Zuni, who appear to be *sui generis*. This line extends north into Colorado over sixty miles, and then it deflects directly south-west across the mountains and the Colorado plateau, until it reaches the vicinity of Prescott. The line then again curves and again deflects slightly south and east towards Phœnix, from which point it moves almost due south-east to the Gila.

In examining the evidence gathered and presented here, there has grown up, not only the theory heretofore presented, that the Arizona ruins belong rather to the Toltec than the Aztec life and civilization, but also one that the destruction of this thriving people was due mainly to two causes—the denudation of the land of timber, and a general outbreak of the wild aboriginal tribes who then inhabited the area embraced between the 31st and 20th degrees. The irruption that destroyed the prehistoric Arizonians came from the south, and first attacked the towns and homes found in the Gila and Salt river valleys. Then came the retreat to the settlements in the valleys of the plateau, and soon the struggle became a constant one between untiring foes on the one side, and a more unfavorable environment on the other. A portion drifted away and died out in a degraded way among the monstrous and inhospitable cañons of the Colorado, becoming cave-dwellers and root-diggers. The main body, however, fell back towards the north-west, finally reaching the terminus of their civilization in south-western Colorado, where they lingered exhausted, but in passable security, until they were as a race obliterated; unless they are to be traced in either the Moqui or Zuni, two peoples, however, quite divergent in physical appearance and traits.



GROUND PLAN OF HOUSE.

Whatever may be the merits of this theory, it can only claim to be a theory. With its statement we leave Arizona—the Coming Country—to the active enterprise, the daring will, the marvelous skill, the unbending courage, and the high hopes that attend the movements of the American people; sure that in the near future a newer, brighter, bolder, stronger, and we trust a more permanent and equitable civilization will arise than any that was seen in the brightest days of that which is now enwrapped in the mists of antiquity.

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APPENDIX.

APPENDIX.

SUMMARY OF MINING LAWS, FEDERAL, TERRITORIAL, AND LOCAL; DESERT AND TIMBER LANDS; HOMESTEAD AND PRE-EMPTION RIGHTS; SPANISH AND RAILROAD GRANTS. LAND OFFICES. OFFICERS OF THE TERRITORY. LEGISLATION ON IRRIGATION. ARTESIAN WELLS, MINING, ETC. ROUTES, DISTANCES, AND FARES FROM AND TO ALL THE PRINCIPAL POINTS EAST AND WEST, AND IN THE TERRITORY. ALTITUDE OF IMPORTANT POINTS. METEOROLOGICAL TABLES. MINERAL SPRINGS. SOUTHERN PACIFIC RAILROAD LANDS, ETC.

Before the passage of the Act of 1866, by Congress, the ownership of the mineral lands was retained by the nation. The first discussion of the policy of selling such lands began in 1850, the argument being to make them a source of revenue. The policy of leaving the mineral land open for private exploration and development prevailed, and remained the rule until 1866. The uncertainty of titles, etc., was urged in 1865-6, as reason for a change. Under legislation preceding that date, no title could be or was conferred to mining claims, beyond possessory rights, maintained by working and payment of a small royalty. Citizens of the United States might explore and occupy under regulations as prescribed by law. In the absence of congressional enactment, local legislation was authorized to provide necessary rules; the local customs and district rules not in conflict with the United States laws were also recognized. The law was, in reality, a license only to go upon the mineral-bearing portions of the public domain. Ownership, however, attached to the minerals extracted, and the government had no claim to them, except so far as royalty or license fees were concerned.

The Act of 1872

Is not compulsory upon miners. They are not obliged to procure a United States patent for their claims. Those who do not, hold exactly the same relations that they did before its passage, provided no adverse claim is interposed. The Revised Statutes of the United States, Sections 2,318 to 2,352, of Title "Mineral Lands"; also, "Miscellaneous" provisions ditto, embracing Sections 910, 2,238, 2,258, 2,386 and 2,408, provide that for

Quartz Mines

Any person who is a citizen of the United States, or who has declared his intention to become a citizen, and no others, may locate and hold a mining claim 1,500 linear feet along the course of any mineral vein or lode subject to location; or any association of persons, severally qualified as above, may make joint location of such claim of 1,500 feet; but in no event

can a location of a vein or lode, made subsequent to the date mentioned, exceed 1,500 feet along the course thereof, whatever may be the number of persons in the company.

With regard to the extent of surface ground adjoining a lode or vein, and claimed for the convenient working of the same, it is provided that the lateral extent of location, made after May 10th, 1872, shall, in no case, exceed 300 feet on each side of the middle of the vein at the surface, and that no such surface rights shall be limited by any mining regulations to less than 25 feet on each side of the middle of the vein at the surface, except where adverse rights, existing on the 10th of May, 1872, may render such limitations necessary; the end lines of such claims to be in all cases parallel with each other.

By the foregoing it will be seen that no lode claim, located after May 10th, 1872, can exceed a parallelogram 1,500 feet in length by 600 in width, but whether surface ground of that width can be taken depends upon the local regulations, or State or Territorial laws then in force in the mining districts; but no such local regulations, or State or Territorial laws, shall limit a vein or lode claim to less than 1,500 feet along its course, nor can surface rights be limited to less than 50 feet in width, unless adverse claims, existing on May 10th, 1872, render such lateral limitations necessary. It is provided by the Revised Statutes that the miners of each district may make rules and regulations not in conflict with the laws of the United States, or of the State or Territory in which the districts are situated, governing the location, manner of recording, and amount of work necessary to hold possession of a claim.

In order to hold a possessory right to a location made prior to May 10th, 1872, not less than $100 worth of labor must be performed or improvements made thereon, within one year from the date of such location, and annually thereafter; in default of which the claim will be subject to re-location by any one else having the necessary qualifications, unless the original locator, his heirs, assigns, or legal representatives, have resumed work after such failure and before the re-location. The expenditures required upon mining claims may be made from the surface, or in running a tunnel for the development of such claims. The Act of February 11th, 1875, provided that where a person or company has run a tunnel for the purpose of developing a lode or lodes, the money so expended shall be considered as expended on the said lode, and the owner or owners shall not be required to perform work on the surface to hold the claim.

Individual proof of citizenship may be made by affidavit. If a company, unincorporated, by the agent's affidavit; if a corporation, by the filing of a copy of charter or certificate of incorporation. Locators against whom no adverse rights rested on the date of the Act of 1872, shall have, on compliance with general law and recognized custom, the exclusive right to

Possession and Enjoyment

Of the surface inclosure, and of "all veins, lodes, and ledges which lie under the top or apex of such lines, extended downward vertically," even though they in their descent extend outside the "side-lines of such surface locations." The right to such outside parts of veins or ledges is confined to all that lies between "vertical planes drawn downward," as described, so continued that these planes "will intersect" the exterior parts of the said "veins or ledges." The surface of another's claim cannot be entered by the locator or possessor of such lode or vein.

What Constitutes a Deposit.

The word "deposit" has always been construed by the Land Office to be a general term, embracing veins, lodes, ledges, placers, and all other forms in which the valuable metals have ever been discovered. Whatever is recognized as a mineral by standard authorities, where the same is found in quality and quantity sufficient to render the land sought to be patented more valuable on this account than for purposes of agriculture, is treated by the Land Office as coming within the meaning of the act. Lands, therefore, valuable on account of borax, carbonate of soda, nitrate of soda, sulphur, alum, and asphalt, it is held may be patented. The first section of the Act of 1872 says, "all valuable mineral deposits." The sixth section uses the term "valuable deposits." Deposits of fire-clay may be patented under the act, and so may iron deposits, which may be patented as vein or placer claims. Lands, more valuable on account of deposits of limestone, marble, kaoline, and mica than for purposes of agriculture, may be patented as mineral lands.

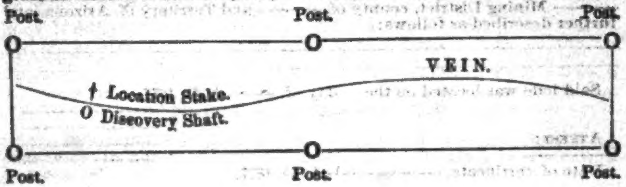
Miners' Form of Notice.

We hereby give notice that we have this —— day of —— A. D., 187—, located this, the ("Centennial") lode. We claim 1,500 feet in and along the vein, linear and horizontal measurement.

We claim 1,200 feet along the vein, running in a northwesterly course from the discovery shaft, and 300 feet running along the vein southeasterly from the discovery shaft. We also claim 150 feet on each side of the vein from center of crevice as surface ground.

W. —— M. ——, } Locators.
H. —— C. ——.

The Act of 1872 provides that no lode-claim can be recorded until after the discovery of a vein or lode within the limits of the ground claimed. The claimant should, therefore, prior to recording his claim, unless the vein can be traced on the surface, sink a shaft, or run a tunnel or drift to a sufficient depth therein to discover and develop a mineral bearing vein, lode or crevice; should determine, if possible, the general course of such vein in the direction from the point of discovery, in which direction he will be governed in making the boundary of his claim on the surface; and should give the course and direction as nearly as practicable from the discovery shaft on the claim to some permanent, well-known points or objects, such as, for instance, stone monuments, blazed trees, the confluence of streams, etc., which may be in the immediate vicinity, and which will serve to perpetuate and fix the *locus* of the claim, and render it susceptible of identification from the description thereof given in the record of location in the district. He should drive a post, or erect a monument of stones at each corner of his surface-ground, and at the point of discovery or discovery-shaft, should fix a post, stake or board, upon which should be designated the name of the lode, the name or names of the locators, the number of feet claimed, and in what direction from the point of discovery; it being essential that the location notice filed for record, in addition to the foregoing description, should state whether the entire claim of fifteen hundred feet is taken on one side of the point of discovery, or whether it is partly upon the other side thereof; and in the latter case, how many feet are claimed upon each side of such discovery point. The following diagram of surface boundaries, etc., of a lode, will aid the locator in this work:



Parties locating a lode are entitled to all the dips, spurs, angles, variations, and ledges of the lode coming within the surface-ground.

The disordered condition of Arizona consequent on the Civil War and the continued hostilities of the Apaches, so impeded mining enterprises, compelling the abandonment of valuable mines and preventing full compliance with the conditions of the preceding acts, from no lack of diligence or skill on the part of miners, that some legislation seemed to be necessary to protect them from the injustice which a strict enforcement of the law would necessitate. The following acts were accordingly passed and approved on the dates specified.

An act approved March 1st, 1873, amends Section 5 of the Act of 1872, above referred to, so as to read as follows: "That the time for the annual expenditure on claims located prior to the passage of said act, shall be extended to the 10th day of June, 1874."

An act approved June 6th, 1874, made a further extension to January 1st, 1875.

An act approved February 11th 1875, so amends Section 2324, Revised Statutes, as to provide that where "a person or company has or may run a tunnel for the purpose of developing a lode or lodes owned by said person or company, the money so expended on said tunnel shall be taken and considered as expended on said lode or lodes, whether located prior to or since the passage of said act; and such person or company shall not be required to perform work on the surface of said lode or lodes in order to hold the same, as required by said act."

Recording Location.

Within a reasonable time, after the location shall have been marked on the ground, notice thereof, accurately describing the claim in manner aforesaid, should be filed for record with the proper recorder of the district, who will thereupon issue the usual certificate of location. The district regulations or customs are followed in this regard. Within ninety days after location, a location certificate must be filed in the office of the Recorder, in the county in which the lode is situated, which should be in the following form:

TERRITORY OF ARIZONA, } ss.
COUNTY OF ——— }

KNOW ALL MEN BY THESE PRESENTS, That — the undersigned, ha— this —— day of ——— A. D. 1877, located and claimed, and by these presents do locate and claim, by right of discovery and location, in compliance with the Mining Acts of Congress, approved May 19th, A. D. 1872, and ALL subsequent Acts, and with the local customs, laws and regulations, —— feet, linear and horizontal measurement, on the ——— Lode, along the vein thereof, with all its dips, angles and variations, together with —— feet on each side of the middle of said vein at the surface; and all veins, lodes, ledges and surface ground within the lines of said claim —— feet, running ——— from center of discovery shaft. Said discovery shaft being situate upon said lode, and within the lines of said claim in ——— Mining District, county of ——— and Territory of Arizona, and further described as follows:

Said lode was located on the — day of ——— A. D. 1877.

——— ———
——— ———
——— ———
——— ———

ATTEST:

Date of certificate, ——————— A. D. 1877.

Labor and Expenditures.

In order to hold the possessory rights to a claim of 1,500 feet of a vein or lode located as aforesaid, the Act requires that until a patent shall have been issued therefor, not less than $100 worth of labor on the basis adopted by the local mining regulations shall be performed, or improvements made thereon, during each year; in default of which the claim will be subject to re-location by any other party having the necessary qualifications, unless the original locator, his heirs, assigns or legal representatives have resumed work thereon after such failure and before such re-location. The importance of attending to these details in the matter of location, labor and expenditure will be the more readily perceived, when it is understood that a failure to give the subject proper attention, may invalidate the claim.

Adverse Claims.

The seventh section of the United States laws provides for adverse claims; fixes the time within which they shall be filed to have legal effect, and prescribes the manner of their adjustment. An adverse mining claim must be filed with the register of the same land-office with whom the application for patent was filed, or in his absence, with the receiver, and within the sixty days' period of newspaper publication of notice. It must be duly sworn to by the party or parties filing the adverse claim, and not by an attorney, before a officer authorized to administer oaths within the land-district, or before the register or receiver; fully set forth the nature and extent of the interference or conflict; whether the adverse party claims as a purchaser for valuable consideration, or as a locator; if the former, the original conveyance, or a duly certified copy thereof, should be furnished; or if the transaction was a mere verbal one he will narrate the circumstances attending the purchase, the date thereof, and the amount paid, which facts should be supported by the affidavit of one or more witnesses, if any were present at the time; and if he claims as a locator, he must file a duly certified copy of the location from the office of the proper recorder. It will be incumbent upon the adverse claimant to file a plat showing his claim, and its relative situation or position with the one against which he claims, so that the extent of the conflict may be the better understood. This plat must be made from an actual survey by a United States deputy surveyor, who will officially certify thereon to its correctness; and in addition there must be attached to such plat of survey a certificate or sworn statement by the surveyor, as to the approximate value of the labor performed or improvements made upon the claim of the adverse party, and the plat must indicate the position of any shafts, tunnels, or other improvements, if any such exist upon the claim of the party opposing the application. Upon the foregoing being filed within the sixty days as aforesaid, the register, or in his absence, the receiver, will give notice in writing to both parties to the contest that such adverse claim has been filed, informing them that the party who filed the adverse claim will be required within thirty days from the date of such filing to commence proceedings in a court of competent jurisdiction, to determine the question of right of possession, and to prosecute the same with reasonable diligence to final judgment; and that, should such adverse claimant fail to do so, his adverse claim will be considered waived, and the application for patent be allowed to proceed upon its merits. When an adverse claim is filed as aforesaid, the register or receiver will indorse upon the same the precise date of filing, and preserve a record of the date of notifications issued thereon; and thereafter all proceedings on the application for patent will be suspended, with the exception of the completion of the publication and posting of notices and plat, and the filing of the necessary proof thereof, until the controversy shall have been adjudicated in court, or the adverse claim waived or withdrawn.

Tunnels.

Tunnels run for the development of a vein or lode, or for the discovery of mines, give the owner or owners the right of possession of all veins or lodes within 3,000 feet from the face of the tunnel to the same extent as if discovered from the surface, *i. e.*, 1,500 feet on the lode; and locations on the line of such tunnels of veins or lodes not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid; but failure to prosecute the work on the tunnel for six months shall be considered an abandonment of the right to all undiscovered veins or lodes on the line of said tunnel. To avail themselves of the benefits of the law, the proprietors of a mining tunnel will be required to give a proper notice of their tunnel location, by erecting a substantial post, bound or monument at the face or commencement thereof, upon which should be posted a good and sufficient notice, giving the names of the party or parties claiming the tunnel right, the actual or proposed course or direction, height and width. At the time of posting notice and marking out the lines of the tunnel, as aforesaid, a full and correct copy of such notice and location must be filed for record with the mining recorder for the district.

Placer Claims.

The laws of the United States provide, also, that no location of a placer claim, made after July 9th, 1870, shall exceed 160 acres for any one person or association of persons, which location shall conform to the United States surveys. All placer claims located after May 10th, 1872, shall conform as nearly as practicable with the United States system of public surveys, and no such location shall include more than 20 acres for each individual claimant.

These provisions of the law are construed by the commissioner of the General Land Office, to mean that after the 9th of July, 1870, no location of placer claim can be made to exceed 160 acres, whatever may be the number of locators associated together, or whatever the local regulations of the district may allow; and that from and after May 10th, 1872, no location made by an individual can exceed 20 acres, and no location made by an association of individuals can exceed 160 acres; which location cannot be made by a less number than eight *bona fide* locators; but whether *as much* as 20 acres can be located by an individual, or 160 acres by an association, depends entirely upon the mining regulations in force in the respective districts at the date of the location; it being held that such mining regulations are in no way enlarged by the statutes, but remain intact and in full force with regard to the size of locations, in so far as they do not permit locations in excess of the limits fixed by Congress; but that when such regulations permit locations in excess of the maxunum fixed by Congress, they are restricted accordingly. A local regulation is valid, therefore, which provides that a placer claim, for instance, shall not exceed 100 feet square. Congress requires no annual expenditures on placer claims, leaving them subject to the local laws, rules, regulations and customs.

District Mining Regulations.

The following will serve as a model for the framing of district laws. They will vary a little in detail, according to the requirements of the locality.

Bounds and Laws of —— District.

By virtue of a notice duly signed and posted, on —— 1877, a meeting of miners was held at place of posting notice on the —— inst., at which place and time the —— Mining District was formed. Mr. —— —— acted as Chairman, and —— —— acted as Secretary.

Following are the laws passed to govern the district:

1. The mining district shall be called the —— Mining District.

2. The district shall embrace the following described and bounded territory: commencing at the easterly end of the —— —— Mine, and running west of north along the eastern boundary of the —— Mining District to the western end of the —— Mine, in the —— Mining District, —— —— Mountains.

3. The County Recorder of —— County, by virtue of his office, shall be, ex-officio, recorder of this district.

4. Chapter six, of title thirty-two, revised statutes of the United States, is adopted as this article.

5. In the location of mines in this district, copies of the notices of location must be placed on the mines before any legal record of the same can be made by the recorder. Any location not so made shall be null and void.

6. All location notices must be filed in the office of the recorder within thirty days after the actual date of location.

7. The County Recorder shall be entitled to a fee of two dollars for each and every notice recorded by him.

8. The records of —— County are hereby adopted as the bona fide records of this district.

9. The annual meeting of the voters of this district shall take place and be holden on the first Monday in May in each year.

10. Ten days prior to the date of holding the annual meeting, the Recorder shall place, or cause to be placed or posted, in three of the most conspicuous places in said district, a notice stating the time when, and the place where, said meeting shall be holden, and shall designate in such notice that the meeting shall be holden for the purpose of transacting all and every kind of business which may be properly brought before it.

11. At each annual meeting, the voters of the district shall elect their chairman and secretary, who shall hold office for one year, or until their successors are appointed.

12. The chairman and secretary of this meeting shall hold office from the —— day of —— for one year, or until their successors are elected.

13. The secretary of each meeting shall keep full and complete records of the minutes and proceedings of their respective meetings, and cause the same to be placed on record in the office of the County Recorder.

14. These rules, regulations and by-laws shall not be altered, or in any way changed, except at a regular annual meeting of the miners of said district, and then only by a legal vote of two-thirds of all the voters present and voting.

15. Any and all persons who are citizens of the United States of America, or who have declared their intention to become such, and own shares of stock or interests in any mine in the district, or who has worked in any mine in the district for the twenty days preceding such meeting, shall be considered a legal voter, and entitled to vote at a miners' meeting.

16. Five dollars per day shall be allowed for each and every eight hours' work performed upon a mine for the purpose of holding title, or performing the necessary amount of work for a patent, and no other expenses shall be considered as expended for the purpose of holding or perfecting title.

17. All mines hereafter located in this district shall be marked by end and corner monuments or stakes, at least eighteen inches in height above ground, with sufficient marks placed in or upon them to show which end or corner of the claim they designate; if stakes are used, they must be sunk at least six inches in the ground, and have a blaze and figures upon one side.

18. All locations made and recorded previous to the adoption of these rules, regulations and by-laws are hereby legalized, so far as they may not conflict with the same.

19. These rules, regulations and by-laws shall be filed and recorded in the office of the County Recorder of —— County, and shall be in full force and effect from and after this —— day of —— 1877.

20. The above proceedings, and the proceedings of any subsequent meeting, shall be signed by the chairman and secretary, and transmitted by them to the County Recorder without delay.

[Signed.]

—— —— Miner.
—— —— Miner.
—— —— Miner.
—— ——
—— ——

I certify that the foregoing is a correct statement of the proceedings had, and of the laws adopted for the —— Mining District, this —— day of —— 1877. —— —— Secretary.

Water Rights.

The United States Revised Statutes provide:

1. That as a condition of sale in absence of legislation by Congress, the legislature of a State or Territory may provide rules for working mines, involving easements, drainage, and other necessary conditions; these to be expressed in the patent.
2. That all prior rights, arising from possession, in the use of water, and recognized by local laws, etc., or judicial decisions, shall be regarded as vested, and shall be protected. This right of way is also granted and confirmed. Damages are to accrue if a land-settler's rights are interfered with.
3. All land patents shall be subject to vested and accrued water-rights, including ditches and reservoirs.

Officers of United States Land Offices are required to file with the General Land Office, the local laws on such matters. The following is a summary of those passed by the legislature of Arizona.

WATER RIGHTS IN THE TERRITORY.—All rivers, creeks, and streams of running water in the Territory of Arizona are deemed public, and applicable to the purposes of irrigation and mining. All the inhabitants of the Territory who own or possess arable or irrigable lands shall have the right to construct public or private acequias, and obtain the necessary water for the same from any convenient river, creek, or stream of running water.

All damages arising from construction of the acequias shall be assessed by the Probate Judge of the county in a summary manner.

No inhabitant of the Territory shall have right to erect any dam or build a mill, or place any machinery, or open any sluice, or make any dyke, except such as are used for mining purposes, or the reduction of metals, that may impede or obstruct irrigation.

When any ditch or acequia shall be taken out for agricultural purposes, the person or persons so taking out such ditch or acequia shall have the exclusive right to the water, or so much as may be necessary for such purpose; and if at any time the water so required shall be taken for mining purposes, the damages shall be assessed and paid.

All owners and proprietors of arable or irrigable land bordering on, or irrigable by, any public acequia, shall labor on such public acequia, whether such owners or proprietors cultivate the land or not; and all persons interested in a public acequia, whether owners or lessees, shall labor thereon in proportion to the amount of the land owned or held by them, and which may be irrigated or subject to irrigation.

In all districts or precincts, the owners or proprietors of land irrigated by public acequias are annually called together by the Justices of the Peace, to elect one or more overseers for the acequias—and it is the duty of said overseers to superintend the opening, excavations and repairs of said acequias; to apportion the number of laborers furnished by the owners and proprietors; to regulate them according to the quantity of land to be irrigated by each one from said acequia; to distribute and apportion the water in proportion to the quantity to which each one is entitled according to the land cultivated by him; and in making such apportionment, he shall take into consideration the nature of the seed sown or planted, the crops and plants cultivated; and to conduct and carry on such distribution with justice and impartiality.

If any owner or proprietor of land irrigated by such acequia shall neglect or refuse to furnish the number of laborers required by the overseer, he shall be fined, and all fines shall be applied to the benefit of said acequia.

Water privileges are, since the United States Act of May 10th, 1872, located in the same manner as mines, subject to local regulations, i. e. by definitely locating the five acres by monuments, and recording with the District or County Recorder. If the local rules and decisions of the Courts make the privilege forfeitable for non-use, another party may come in and claim the water right.

The Federal Courts have decided that the right of way to construct flumes or ditches, over the public lands, is unquestioned. It has also been decided that the miners' right to water, within "reasonable limits," is not to be questioned. "It must be exercised," however, with due regard to the general condition and needs of a community, and cannot vest as an individual monopoly.

Mill Sites.

Land non-mineral in character, and not contiguous to the vein or lode, used by the locator and proprietor for mining or milling purposes, can be included in any application for patent, to an extent not to exceed five acres, and subject to examination and payment as fixed for the superficies of the lode. The owner of a quartz mill or reduction, not a mine owner in connection therewith, may also receive a mill-site patent. Such sites are located under the mining act, and in compliance with local law and customs as recognized. Such possessory rights give title also to all growing timber thereon. There must in every case be given satisfactory proof of the non-mineral character of the site, and the improvements thereon must be equal to $500 in value. A mill passes to a railroad, if located after a land grant inured to the road.

Homestead and Pre-emption.

HOMESTEADS.—Every head of a family, widow, single man or woman of the age of twenty-one years, who is a citizen of the United States, or who has declared his or her intention of becoming so, can enter upon 80 acres of government land within the limits of a railroad grant, or 160 acres outside said limits; and after a continuous residence upon it and cultivation for five years, an absolute title to the land will be given by the United States government, at a total cost of about $9 on 80 acres, or $18 on 160 acres.

SOLDIER'S HOMESTEAD.—Any soldier or sailor who served during the rebellion not less than 90 days, and was honorably discharged, can homestead 160 acres, either within or outside of the limits of a land grant, and his term of service will be deducted from the five years' residence required upon the land; but in any event he must reside one year upon it. Thus, if he served three years, he would have to reside upon the land two years; and in the event of his having served four or five years, one year's residence would be necessary.

A soldier or sailor has the privilege of filing application for homestead upon the land through an agent or attorney, and need not for six months commence actual settlement upon it. Absence from a homestead at any time, for more than six months, works a forfeiture of right to the land.

Pre-emptions.—Any person qualified under the homestead laws can pre-empt 160 acres of government land within the limits of a railroad grant, and after an actual residence upon and cultivation of the same for at least six months, can obtain title by payment of $2.50 per acre, or, if outside the limits, $1.25 per acre. It is imperative, however, that the person so pre-empting shall (with his family, if any) reside upon the land. The cultivation of a few acres is sufficient. The same person, after having complied with the requirements of the laws of pre-emption, can homestead 80 acres within the railroad grant, or 160 acres outside the limits. In this way, a soldier or sailor can secure 320 acres within the limits; and it is open to the *world at large* for *any* man to acquire his 240 acres.

An Additional Homestead.—In addition to the Homestead and Pre-emption laws, a recent act has been passed, whereby every settler, as the fruits of his industry, can obtain another freehold of 160 acres under the following act:

An Act to amend an Act entitled "An Act to encourage the growth of timber on western prairies."

"Any person who is the head of a family, or who shall have arrived at the age of twenty-one years, and is a citizen of the United States, or who shall have filed his declaration of intention to become such, who shall plant, protect and keep in a healthy, growing condition for eight years, 40 acres of timber, the trees thereon not being more than twelve feet apart each way, on any quarter section of any of the public lands of the United States, or 20 acres on any legal subdivision of 80 acres, or 10 acres on any legal subdivision of 40 acres, or one-fourth part of any fractional subdivision of land less than 40 acres, shall be entitled to a patent for the whole of said quarter section, or of such legal subdivision of 80 or 40 acres or fractional subdivision of less than 40 acres, as the case may be, at the expiration of the said eight years, on making proof of such fact by not less than two credible witnesses.

How to Pre-empt.—When you have selected the land you wish for pre-emption or homesteading under whatever right, it is better to get a land attorney or clerk in the nearest land office to make out the necessary papers. This saves time, and the danger of mistakes.

The Latest Regulations.—Commissioner Williamson, of the General Land Office, has issued a circular to all registers and receivers throughout the country, containing instructions requisite to carry into effect two Acts of Congress, approved on the 3rd of April, relative to homestead entries. The first provides a new method of making the final proof in homestead entries. It dispenses with the present necessity of attendance at the district land office. The person desiring to avail himself thereof must appear with his witnesses before the judge of a court of record of the county and State, or district and Territory in which the land is situated, and there make the final proof required by law according to the prescribed forms; which proof is required to be transmitted by the judge or the clerk of the court, together with the fee and charges allowed by law. The judge being absent in any case, the proof may be made before the clerk of the proper court. The fact of the absence of the judge must be certified in the papers by the clerk acting in his place. If the land in any case is situated in an unorganized county, the statute provides that the person may proceed to make the proof in the manner indicated, in any adjacent county in the State or Territory. The fact that the county in which the land lies is unorganized, and that the county in which the proof is made is adjacent thereto, must be certified by the officer. The other law to which attention is invited by this circular is entitled "An Act for the relief of settlers on the public lands under the pre-emption laws." Under this statute, a person desiring to change his claim under a pre-emption filing to that of a homestead entry, should be required, on making the change, to appear at the proper land office with his witnesses, and show full compliance with the pre-emption law to the date of such change, as has heretofore been required in transmutation cases. Proof of such compliance must be forwarded with the entry papers to this office. When the person applies to make final proof, he must show continued residence and cultivation as required by the homestead law. In case an adverse claim has attached to the land, due notice in accordance with rules of practice must be given all persons in interest, of time and place of submitting proof in support of the application to make such change. The adverse claimants will be entitled to the privilege of cross-questioning the applicants' witnesses, and of offering counter proof.

Lands formerly designated

As Mineral,

Can be entered by preëmption upon proof that mines or minerals are not contained therein. Lands found, after entry as agricultural, to contain valuable mineral deposits, such entry will be cancelled. Where, however, a patent has issued, and the land has been afterwards found to embrace a valuable deposit or lode, the title is valid, as the land has ceased to be part of the public domain. Proof, however, that the deposit, lode or mine was known before the patent issued will invalidate title thereto. Titles to town sites and lots are held subject. also, to mineral rights, which remain in the United States.

Under Act of 1876, it was permitted to any person, under the limit of citizenship, or declaration of intent, to proceed upon the public land, and occupy such area, to the extent of one section, or 640 acres, which cannot be cultivated or used for agricultural purposes, with the artificial conveying of water thereon and irrigation; three years being given to construct the necessary works and improvements. The price of such land is to be $1.25 per acre, one-fifth being required to be paid at the time of location. In consequence of doubt as to the character of land which this act was designed to embrace, and charges made of fraudulent entries, further legislation will doubtless be had on this subject.

Coal lands are allowed to be entered in legal subdivision parcels, not to exceed 160 acres to any one person, or double that quantity to an association; the price of the same to be $20 and $10 per acre, according to whether or not the same be located within fifteen miles of a completed railroad.

Rivers are deemed navigable only when they are used, or are susceptible of being used, for commercial highways. The shores and soil under them were reserved to the States respectively, and new States have the same jurisdiction and sovereignty as old ones. The Land Office has never permitted a complication of such rights by attempting or permitting the sales of any portion of the beds of said rivers or streams.

Saline lands are not subject to homestead or preëmption entry. This policy has been uniform since the beginning of our land system. The Supreme Court has held uniformly that Congress has uniformly designed to prevent the sale of saline deposits and springs. The existence of such deposit or spring withdraws any quarter or other large portion of a section from settlement and location.

United States Land Office Fees.

United Sates Land Office Registers and Receivers are permitted by law to charge the following fees:

Homestead or pre-emption declaratory statement	$1 00
On final certificate for each 160 acres	5 00
" " " 320 "	10 00
" " " section, or 640 acres	15 00
Locations by States under grants, for each 160 acres	1 00

For superintending public land sales	5 00
For acting on application for patent or adverse mineral claim	5 00
For testimony either in mineral or agricultural land cases, taken in writing, for claimants, each 100 words	15

Under the laws of Arizona the County Recorders are authorized and required to keep a record of all mines and mineral deposits that are located. For this work they are entitled to receive for recording each claim:

Not to exceed one folio	$1 00
For each additional folio	20

It is also provided by act of territorial legislature, approved November 9th, 1864, that persons in the military service of the United States may locate mineral claims, all local or district regulations to the contrary notwithstanding.

Under the Act of December 30th, 1865, in relation to placer mines and mining, it is provided that in the county of Yuma, persons who in locating placers shall place, for the purpose of mining thereon, a pump or pumps with a capacity of 100 gallons per minute, may be entitled to locate of placer land not to exceed 160 acres. This privilege is not to include placer land which can be worked by water brought in ditches or flumes.

Under Act of September 30th, 1867, it is provided that joint mining claims may be segregated, when any of the owners thereof refuse or fail to join in working them, after notices in the county or other newspaper published nearest thereto, for the period of four weeks. After such notice, the parties issuing may apply to the District Court; notice is then posted conspicuously by the clerk, for requiring the delinquents to appear within sixty days, and show why the prayer should not be granted. At the end of this last period two commissioners may be appointed, who choose a third; and they examine and report in writing. A decree shall issue in accord with the report. Thirty days are allowed for an appeal to the Supreme Court.

All grants of lands within the Territory, individual or corporate, whether held under Mexican or United States titles, must be recorded in the office of the County Recorder where situated. If not so entered, they are declared null and void. It is provided also that settlers shall be protected in the occupancy, use and improvement of 340 acres of public lands

Arizona Mine Mills.

Within the past few months there have been brought into Arizona the following quartz mills, all of which are now being set up, or are already in operation:

Champion (steam drop)	2	stamps
Silver King	5	"
Townsend & Co. (5 already up)	10	"
Peck (originally Black Warrior	10	"
Signal	10	"
McCrackin	20	"
Hackberry	10	"

Walnut Grove (10 ?)	5	stamps
Dean	10	"
Knowles (Empire Flat)	10	"
Masterson's, Turkey Creek	2	"
No. of stamps not mentioned.		
Total	94	stamps

Of the mills which have been in operation since and before last spring, we can recall the following:

Ostrich (it may be 10)	5	stamps
Morrill & Ketchum	6	"
Tidwell	3	"
Aztlan	5	"
Frederick's	10	"
Constancia (now Luke's)	10	"

Mineral Park	5	stamps
Crook	5	"
Greenwood	10	"
Bill Smith's	10	"
Total	60	stamps

Yuma Sentinel, October.

Table Showing the Value of any Amount of Gold Dust, from 1 grain to 10 ounces, at $16 to $23 per ounce.

OUNCES.

No.	$16.00 per oz.	$17.00 per oz.	$18.00 per oz.	$19.00 per oz.	$20.00 per oz.	$21.00 per oz.	$22.00 per oz.	$23.00 per oz.
1	16	17	18	19	20	21	22	23
2	32	34	36	38	40	42	44	46
3	48	51	54	57	60	63	66	69
4	64	68	72	76	80	84	88	92
5	80	85	90	95	100	105	110	115
6	96	102	108	114	120	126	132	138
7	112	119	126	133	140	147	154	161
8	128	136	144	152	160	168	176	184
9	144	153	162	171	180	189	198	207
10	160	170	180	190	200	210	220	230

PENNYWEIGHTS.

No.	$16.00 per oz.	$17.00 per oz.	$18.00 per oz.	$19.00 per oz.	$20.00 per oz.	$21.00 per oz.	$22.00 per oz.	$23.00 per oz.
1	80	85	90	95	100	105	110	115
2	160	175	180	190	200	210	220	230
3	240	255	270	285	300	315	330	345
4	320	340	360	380	400	420	440	460
5	400	425	450	475	500	525	550	575
6	480	510	540	570	600	630	660	690
7	560	595	630	665	700	735	770	805
8	640	680	720	760	800	840	880	920
9	720	765	810	855	900	945	990	1035
10	800	850	900	950	1000	1050	1100	1150

GRAINS.

No.	$16.00 per oz.	$17.00 per oz.	$18.00 per oz.	$19.00 per oz.	$20.00 per oz.	$21.00 per oz.	$22.00 per oz.	$23.00 per oz.
1	3⅓	3½	3¾	4	4 1-6	4⅜	4½	4¾
2	6⅔	7	7½	8	8⅓	8¾	9	9½
3	10	10½	11¼	12	12½	13	13½	14¼
4	13⅓	14	15	16	16⅔	17½	18	19
5	16⅔	17½	18¾	20	20 5-6	21⅞	22½	23¾
6	20	21	22½	24	25	26	27	28½
7	23⅓	24½	26¼	28	29 1-6	30⅝	31½	33¼
8	26⅔	28	30	32	33⅓	34⅞	36	38
9	30	31½	33¾	36	37½	39	40½	42¾
10	33⅓	35	37½	40	41⅔	43¾	45	47½

Out of a ton of ore from the Stonewall Jackson Mine, adjoining the General Lee, in the Globe District, (Arizona) there was extracted October 25th, by the Pacific Refinery, San Francisco, ten bars of silver valued at $3,800, which is over 36 per cent. metallic copper.

At Clinton, Arizona, the great copper mining center, the Longfellow Company have two furnaces running, and turn out as high as 10,000 pounds of pig copper daily. The furnaces used are Bennett's patent. Arizona has, without doubt, the richest and most extensive copper mines in the world. This metal is all shipped east by way of El Moro.

The Ores of Gold and Silver.

NAME.	COMPOSITION.
Native gold	Gold; silver up to 40 per cent.; copper and iron.
Quicksilver	Mercury, with sometimes a little silver.
Amalgam	Silver, 26 to 35; mercury, 74 to 65.
Arquerite	Silver, 87; mercury, 13.
Gold Amalgam	Mercury, 58 to 61; silver, 0 to 5; gold, 38 to 42.
Native silver	Silver, alloyed with other metals.
Bismuth	Bismuth, 27; lead, 33; silver, 15; iron, 4; copper, 1; sulphur, 16.
Native copper	Pure copper, with small quantity of silver through it.
Tellurium	Tellurium, with gold and iron, varying quantities.
Antimony	Antimony, containing at times silver, iron, or arensic.
Discrasite	Antimony, 23; silver, 77.
Silver glance	Sulphur, 13; silver, 87.
Naumannite	Selenium, 27; silver, 73.
Eucairite	Selenium, 32; copper, 25; silver, 43.
Hessite	Tellurium, 37; silver, 63.
Stromeyrite	Sulphur, 16; silver, 53; copper, 31.
Sylvanite	Tellurium, 56; gold, 28; silver, 16.
Nagyagite	Tellurium, 13 to 32; lead, 51 to 61; gold, 6 to 9.
Sternbergite	Sulphur, 34; silver, 32; iron, 34.
Miargyrite	Sulphur, 21; antimony, 43; silver, 36.
Pyrargyrite, or ruby silver	Sulphur, 18; antimony, 23; silver, 59.
Proustite, or ruby silver	Sulphur, 20; arsenic, 15; silver, 65.
Freieslebenite	Sulphur, 19; antimony, 27; lead, 30; silver, 24.
Tetrahedrite, or gray copper.	Sulphur, arsenic, antimony, silver, copper, iron, zinc, and mercury, in most varying proportions.
Polybasite	Sulphur, 16; antimony, 13; silver, 71.
Stephanite	Sulphur, 16; antimony, 14; silver, 70.
Xanthocone	Sulphur, 21; arsenic, 15; silver, 64.
Fireblende	Sulphur, antimony, with silver, up to 62 per cent.
Cerargyrite, or horn silver	Chlorine, 25; silver, 75.
Embolite	Chlorine, 13; bromine, 20; silver, 67.
Megabromite	Chlorine, 9; bromine, 27; silver, 64.
Mikrobromite	Chlorine, 18; bromine, 12; silver, 70.
Bromyrite, or bromic silver	Bromine, 43; silver, 57.
Iodyrite, or iodic silver	Iodine, 54; silver, 46.
Jalpaite	Copper and silver glance.
Acanthite	Sulphuret of silver.
Crookesite	Copper, thallium, silver, and selenium.

Charles P. Stanton, geologist, writes to the Prescott "Miner," under date of Nov. 9th, 1877, as follows: The great carboniferous basin of Arizona—and in all probability of the world—exists within 140 miles of Prescott. This immense coal deposit makes its first appearance in Southwestern Colorado and Northwestern New Mexico; but its great nucleus extends from Tierra Ausarilla, in Rio Arriba, New Mexico, to the Colorado River, a distance of 276 miles, and from the San Juan River, a distance of 138 miles. This immense area of 38,088 square miles is one continuous mass of coal. It lies between the parallels of 109 and 112 west longitude, and 35 and 37 north latitude, and all in Yavapai County.

Weight and Specific Gravity of the Common Minerals.

NAME.	COMPOSITION.	Specific gravity.	Weight of cubic inch (ounces).	Weight of cubic foot (pounds).
Gold, pure		19.3	11.169	1,206.25
Gold, native	Gold, silver, copper, and iron.	17.5	10.128	1,093.75
Silver, pure		10.6	6.134	662.50
Silver, native	Silver and other metals	10.	5.787	625.00
Copper, native	Copper	8.9	5.150	556.25
Vitreous Copper	Sulphuret of copper, 21; copper, 79	5.6	3.298	350.00
Copper pyrites	Sulphur, 35; copper, 35; iron, 30	4.2	2.430	262.50
Red copper	Copper, 89; oxygen, 11	5.9	3.414	368.75
Gray copper	Sulphur, arsenic, antimony, silver, copper, iron, zinc, and mercury in most varying proportions	4.8	2.777	300.00
Malachite	Carbonic acid, 20; oxide of copper, 72; water, 8	3.8	2.199	237.50
Tin oxide	Oxygen, 22; tin, 78	6.7	3.877	418.75
Tin pyrites	Tin, 27; copper, 30; iron, 13; sulphur, 29	4.4	2.546	275.00
Lead, pure		11.4	6.597	712.50
Galena	Sulphur, 13; lead, 87	7.5	4.340	468.75
Carb. of lead	Carbonic acid, 16; oxide of lead, 84	6.4	3.715	400.00
Zinc		7.0	4.051	437.50
Red oxide of zinc	Zinc, 80; oxygen, 19; oxide of manganese	5.4	3.125	337.50
Antimony		6.8	3.935	425.00
Gray oxide of antimony	Sulphur, 29; antimony, 71	4.5	2.025	281.25
Nickel		8.4	4.861	525.00
Arsenical nickel	Arsenic, 56; nickel, 44	7.5	4.340	468.75
Sulphuret	Nickel, sulphur, arsenic	6.2	3.588	387.50
Cobalt pyrites	Cobalt, 58; sulphur	5.0	2.893	312.50
Iron, cast		7.2	4.166	450.00
Iron, wrought		7.78	4.496	486.25
Iron pyrites	Sulphur, 53; iron, 47	4.9	2.835	306.25
Magnetic iron	Oxygen, 28; iron, 72	5.1	2.951	318.75
Arsenical iron	Arsenic, 46; sulphur, 20; iron, 34	5.7	3.298	356.25
Specular iron	Oxygen, 30; iron, 70	4.9	2.835	306.25
Hematite	Oxide of iron, 86; water, 14	4.0	2.314	250.00
Uranium, or pitchblende	Oxygen, 15; uranium, 85	7.0	4.051	437.50
Baryta or heavy spar		4.0	2.314	250.00
Lime rock		3.0	1.736	187.50
Calc spar		2.7	1.562	168.75
Fluor spar		3.15	1.822	196.87
Quartz		2.69	1.673	167.452
Granite		2.78	1.608	173.75

NOTE.—A vein of ore one inch thick, six feet long, and six feet high, will measure three cubic feet; two inches, six cubic feet, and so on in proportion, allowing three cubic feet for every inch of ore in the lode, six feet high and six feet long.

Excellent Advice to the Emigrant Traveler

Is given by the California Immigrant Union, No. 348 Montgomery Street, San Francisco, which, if heeded, will be of service:

1. Buy your tickets for passage on railroad or steamboat, only at the office, before starting. Many of the runners who offer tickets for sale in the streets are swindlers. If you intend to go in a steamer or ship, examine the vessel before getting your ticket, and engage a particular berth or room in a part of the vessel that is clean, well ventilated and just comfortably warm.

2. Never show your money nor let any stranger know that you have any. Thieves prefer to rob emigrants, who generally carry money with them, and cannot stop to prosecute them, and have no acquaintances to aid in the prosecution. Do not mention the fact that you are an emigrant to persons who have no business to know it.

3. Never carry any large sum of money with you; you can always buy drafts at banks, and if you are going to a strange place you can give your photograph to the banker to forward to your destination, so that you can be identified without trouble when you want to draw your money.

4. Avoid those strangers who claim to be old acquaintances, and whom you do not recollect. A certain class of thieves claim the acquaintance of ignorant countrymen whom they want to rob.

5. Do not drink at the solicitation of strangers; the first point of the thief is to intoxicate or drug his victim.

6. Do not play cards for money with strangers; in many cases they confederate to rob emigrants.

7. Travel in company with old friends, if possible, and do not leave them. Thieves prefer to take their victims one at a time.

8. If you see anybody pick up a full pocket-book, and he offers it to you for a small sum; or if you see some men playing cards, and you are requested to bet on some point where it seems certain that you must win; or if you see an auctioneer selling a fine gold watch for five dollars, don't let them catch you. Emigrants are systematically swindled by such tricks.

9. If, when you arrive in a strange town, you want information and advice, you can always get it by applying at the right place. First, apply at the office of the Immigration Society, if there is one. If you are a foreigner, you will probably find in the large cities a Consular office or a benevolent society of your countrymen, and you can apply there. Usually, there are attentive and polite men at the police office. Public officers generally in the United States are ready to assist and advise strangers.

10. Before starting from home, carefully read all the accessible books about the State or Territory to which you intend to go; and when you arrive, go to some place where you can find old friends, if you have any. If you are poor, commence work immediately, but do not be in a hurry to buy land, unless with the approval of men whom you can trust. Take a month or two to get information about the country. Advice about the purchase of land is often given with corrupt motives.

White Mountain Reservation.—The boundaries of the reservation to be as follows, as shown in red on the accompanying map: Starting at the point of intersection of the boundary between New Mexico and Arizona with the south edge of the Black Mesa, and following the southern edge of the Black Mesa to a point due north of Sombrero or Plumoso Butte; then due south to said Sombrero or Plumoso Butte; then in the direction of the Picache Colorado to the crest of the Apache Mountains, following said crest down the Salt River to Pinal Creek, and then up the Pinal Creek to the top of the Pinal Mountains; then following the crest of the Pinal range, "the Cordilleras de la Gila," the "Almagra Mountains," and other mountains bordering the north bank of the Gila River to the New Mexican boundary, near Steeple Rock; then following said boundary north to its intersection with the south edge of the Black Mesa, the starting point.

Southern Pacific Railroad.

Regular and Special Rates in U. S. Gold Coin for the "Loop Route."

BETWEEN SAN FRANCISCO AND	NEWHALL.	SAN BUENAVENTURA.	SANTA BARBARA.	LOS ANGELES.	SAN DIEGO.	COLTON.	YUMA.
Distances	438 M	488 M	518 M	470 M	606 M	528 M	720 M
(1) Unlimited First Class	$25 85	$30 85	$33 85	$28 00	$38 00	$31 00	$50 00
(2) Unlimited First Class, including Yosemite	......	......	......	65 00	......	......	......
(3) Limited First Class	20 00	24 00	27 00	20 00	30 00	23 00	42 00
(4) Limited Third Class	10 00	15 00	18 00	10 00	20 00	13 00	32 00

(1) Allows stop-over privileges, at pleasure, upon notifying Conductors.
(2) Includes the Tourists' Trip from Merced to Yosemite and Return.
(3) Limited to a continuous trip between San Francisco and Los Angeles.
(4) Limited to a continuous trip between San Francisco and Los Angeles, on Third Class Trains.

T. H. GOODMAN,
General Pass. & Ticket Agent.

Eastern Railroad Rates.

FIRST-CLASS.

From	*Denver or Colorado Springs.*
St. Louis to	$50 00
Chicago to	65 00
Cincinnati to	65 00
Quincy to	49 00
Kansas City to	45 00
Atchison to	45 00

EMIGRANT RATES.

From	*Denver and Pueblo.*	*La Veta.*
New York to	$31 55	
St. Louis to	22 00	$25 00
Cincinnati to	30 00	33 00
Quincy to	22 40	25 40
Chicago to	29 40	32 40
Toledo to	34 40	37 40
Indianapolis to	29 00	32 00
Kansas City to	20 00	24 00
Atchison to		

FREIGHT RATES.

Household goods, trees and shrubbery, farm implements, wagons, stock, old mining tools, etc., emigrant's account only, from Kansas City to Denver, Colorado Springs, and Pueblo, $100 per car; less than car loads, $1 per 100 lbs. To El Moro, $130 per car; less than car loads, $1.30 per 100 lbs.

FROM MISSOURI RIVER TO COLORADO, EN ROUTE TO ARIZONA.

First-Class Fare.—Atchison or Kansas City to Pueblo, Colorado Springs, and Denver, $35; Veta, $38; Cañon City, $36.25.

Second-Class Fare.—From Kansas City, Atchison, Topeka, and Lawrence to Pueblo and Denver, $30; Veta, $33.75; Cañon City, $32; El Moro, $35; Del Norte, $51.75; Lake City, $67.75; Santa Fé, $75.

From Kansas City, Atchison, Topeka, and Lawrence to West Las Animas, $26.

Emigrant Rates.—From Kansas City, Atchison, Topeka, and Lawrence to West Las Animas, La Junta, Pueblo, and Denver, $20; Veta, $24; Cañon City, $22.50; El Moro, $25.50; Del Norte, $42.50; Lake City, $58; Santa Fé, $65.50.

Distance to Santa Fé, New Mexico.—From Atchison or Kansas City to Trinidad, Col., 707 miles by rail; from Trinidad, by stage, to Cimarron, 74 miles; to Fort Union, 14 miles; to Las Végas, 139 miles; and to Santa Fé, 214 miles; making the total distance from Atchison or Kansas City 923 miles—707 miles by rail and 216 by stage. From Santa Fé to Mesilla, 180 miles by stage; to Silver City, from the same, 385 miles. At this point, connection is made by the Southern Pacific mail stages either for El Paso and the Texas routes, via Mesilla, or northward, by way of Santa Fé and as above, to the Colorado and Kansas railroads.

FARES FROM SAN FRANCISCO.

By Coast Steamer.—San Pedro or Santa Monica—cabin, $14; steerage, $9, including berth and meals; time about 45 hours to Santa Monica; leave San Francisco every two or three days, at 9 A. M. San Francisco to San Diego—cabin, $15; steerage, $10; San Pedro to Los Angeles, 50 cents; Santa Monica to Los Angeles, $1.

Los Angeles to Yuma, $23, railroad; Los Angeles to Dos Palmas, $13.10, railroad; Dos Palmas to Ehrenberg, stage, $20; Los Angeles to Colton, $3; Colton to Yuma, $19; Colton to Dos Palmas, $10.10. Sleeping berths, (two nights) $5. Yuma to Ehrenberg, steamer—cabin, $15; deck, $10. San Francisco to Ehrenberg, (by steamer, cabin, to Santa Monica; thence railroad to Dos Palmas, and stage to Ehrenberg) $48.10. Same points, by railroad to Yuma and steamboat thence, $65; or by railroad to Dos Palmas and stage thence, $55.10.

Stage Fares.—Tucson to Altar, Sonora, $10; to Hermosillo, Sonora, $20. Leave Tucson every Monday noon; return Saturdays, 10 A. M.

Express Matter.—On 25 pounds and over, to Altar, four cents per pound; to Hermosillo, eight cents per pound.

The fare to and from Prescott to Los Angeles, San Francisco, Sacramento, or San José, by California and Arizona stage to Dos Palmas, and thence by rail, is as follows:

To Los Angeles	$61 25	To San Francisco............	$86 75
To San José	86 75	To Sacramento..............	86 75

The person holding a ticket has the privilege of stopping over in Los Angeles or other points on the railroad for a reasonable length of time.

Schedule Time by Overland Stage from Yuma, leaving San Francisco by Southern Pacific R. R. thereto

Time.	*Arrives.*		*Time.*	*Arrives.*	
2nd day	1 P. M.	Gila City........Ar.	7th day	11 A. M.	Silver City ..N. M.
3rd "	9 A. M.	STANWIX........ "	8th "	12 M.	MESILLA........ "
3rd "	7 P. M.	Gila Bend........ "	8th "	1 P. M.	Las Cruces...... "
4th "	5 A. M.	Maricopa Wells "	9th "	1 A. M.	EL PASO........Tex.
4th "	10 A. M.	PHOENIX........ "	11th "	12 MN.	Fort Davis ..... "
4th "	3 P. M.	FLORENCE....... "	12th "	1 A. M.	Fort Stockton "
4th "	5 P. M.	C'mp McDowell "	13th "	2 A. M.	Fort Concho.. "
5th "	6 A. M.	TUCSON .... "	14th "	11 P. M.	Fort Worth... "
6th "	6 A. M.	Camp Grant.... "	14th "	11 P. M.	San Antonio.. "
6th "	11 A. M.	Camp Bowie ... "	14th "	11 P. M.	AUSTIN........ "

United States Military Telegraph—California, Arizona and New Mexico Divisions.

TABLE OF DISTANCES.

Stations.	*Miles.*
San Diego, Cal.	0
Campo, Cal.	43
Yuma, A. T.	173
Stanwix, A. T.	260
Maricopa Wells, A. T.	364
Florence, A. T.	410
Tucson, A. T.	473
Tres Alamos, A. T.	519
Camp Grant, A. T.	572
Camp Bowie, A. T.	617
PRESCOTT BRANCH.	
Phœnix, A. T.	389
Wickenburg, A. T.	438
Prescott, A. T.	487
Camp Verde, A. T.	526
APACHE BRANCH.	
Camp Grant	572
Camp Goodwin	612
Camp Apache	637
Ralston, New Mexico	663
Silver City, New Mexico	712
Fort Bayard, New Mexico	721
Fort Cummings, New Mexico	760
Mesilla, New Mexico	811
Los Cruces, New Mexico	813
Fort Selden, New Mexico	831
Fort McRae, New Mexico	880
Fort Craig, New Mexico	922
Albuquerque, New Mexico	1,033
Bernalillo, New Mexico	1,051
Santa Fe, New Mexico	1,097

ITINERARY.

STAGE, MILITARY, AND MINE ROADS, STATIONS, TOWNS, AND MILITARY POSTS. WATER, WOOD, GRASS, ETC., EN ROUTE. COMPILED FROM THE BEST MILITARY AND OTHER AUTHORITIES.

Yuma, A. T., to Mesilla, N. M.—Overland Road and Stations of the S. P. O. M. S. Line.

	Miles.	
YUMA, A. T.*		
Desconso	14	14
Gila City	8	22
Rattlesnake	7	29

Yuma, A. T., to Mesilla, N. M.—(Continued.)

	Miles.	
Mission Camp (1)	3	32
Filibuster	12	44
Antelope Peak	6	50
Mohawk (2)	16	66
Teamster's Camp (3)	20	86
Stanwix *	20	96
Burke's (4)	12	108
Oatman Flat (5)	10	118
Gila Bend (6)	30	148
Maricopa Wells * (7)	43	191
Pima Villages (8)	12	203
Sweet Water	7	209
Sacaton	6	215
Montezuma	10	225
Sanford (9)	8	233
Florence * (10)	4	237
Desert Wells	36	273
Point of Mountain	9	282
Water Holes	9	291
Tucson * (11)	9	300
Cienega (12)	30	330
Tres Alimos (13)	20	350
Steel's Ranch (14)	40	390
Apache Pass * (Camp Bowie) (15)	35	425
Ralston, New Mexico	50	475
Knight's Ranch, New Mexico	25	500
Silver City, " (16)	25	525
Fort Bayard, "	10	535
Rio Membres, "	40	565
Fort Cummings * "	20	585
Slocum's, "	30	615
MESILLA, " (17)	15	645

* Telegraph Offices.

At all stations, wood, water, and grass, or other feed, are to be found. At most of them, a small store is also kept. Meals and lodgings can be obtained. (1) At Mission Camp, there is a road south and west, to the old Papago country, via Cabaza Prieto. (2) From Mohawk is a road due south to the same region. (3) Five miles east of Teamster Camp is a route south to the Ajo Copper Mines, and then southwest to Sonora. (4) At Burke's is a road south to the same point. (5) At Painted Rock, north of and near this station, a road to Phœnix comes in. (6) Near Gila Bend, a road diverges south, through the old Papago country, to old mines and deserted Indian villages. (7) At Maricopa Wells, roads north and south diverge direct to Tucson, the Papagonia, to Phœnix, Camps McDowell, Verde, and Apache. (8) At Pima Villages, a road diverges north, passing through the Maricopa village (Indians, 800). There are 5,000 Pima Indians, living in ten large and several small villages, between this station and Montezuma. There is also a road directly south from Pima. (9) Road south to Desert Wells. (10) From Florence, regular stages leave for Silver City, Pioneer District; Globe City, Globe District; San Carlos, and Camp Apache; also, to Hayden, East Phœnix, Phœnix, Wickenburg, and Prescott. There is a direct road to old Camp Grant, east, and thence to the San Pablo Valley and Arivipa settlements. (11) At Tucson, the highway to Mexico, via the valley of the Santa Cruz, diverges west. Stages leave for Guaymas. (12) Near Cienega, a road diverges to Davidson's, the Santa Rita placers, old Camps Crittenden and Wallen, the Patagonias, and the old Presidio San Pedro (U. S. Camp Huachuca). (13) At Tres Alimos, there is a road north and up the San Pedro Valley to San Carlos, the Globe District, and Camp

Apache. (14) There are roads north and south at this point to Camp Grant and the old Chiricahua Reservation, now abandoned, and thence, by trails, etc., to Sulphur Springs Valley, Dragoon Mountains, etc. (15) There is a road north direct to Safford, on the Gila. (16) Stages here for the most southerly station, via Santa Fé, on the Denver & Rio Grande N. G. R. R.; thence east, via Colorado and Kansas railroads. (17) At Mesilla, the overland stages connect with branch to El Paso, Fort Worth, etc., Texas

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Distances Between Stations, commencing at Dos Palmas, on S. P. R. R., and thence over Lines of Cal. and Arizona Stage Co.

			Miles.	
Dos Palmas	west to	Canyon Springs	15	
Canyon Sp'gs	"	Chuckawalla	36	51
Chuckawalla	"	Mule Springs	18	69
Mule Springs	"	Willows	29	98
Willows	"	EHRENBERG (1)	11	109
Ehrenberg	"	Tyson's Wells (2)	22	131
Tyson's Wells	"	Desert Well (3)	28	159
Desert Well	"	Mungia Well	17	176
Mungia Well	"	Cullings Well (4)	15	191
Cullings Well	"	Point Mountain	25	216
Point Mountain	"	WICKENBURG (5)	20	236
Wickenburg	north to	Partridge City	17	253
Partridge City	"	Antelope Valley	10	263
Antelope Val'y	"	Dixon	17	280
Dixon	"	PRESCOTT (6)	17	297
Wickenburg	south to	Smith's Mills (7)	15	
Smith's Mills	"	Agua Fria	28	43
Agua Fria	"	PHŒNIX (8)	22	65
Phœnix	"	Hayden Ferry	9	74
Hayden Ferry	"	House's Well	20	94
House's Well	"	Florence	20	114
Florence	"	Tucson (overland stage)	63	277

(1) Ehrenberg is a steamboat landing of importance. Roads north to La Paz, the Colorado Reservation Camp and Agency, and south to Eureka and Castle Dome district. (2) A road branches here southward to Castle Dome landing, and the mines in that district. (3) At this station mine roads diverge to the Harcuvar District and mines; an extensive stock range is found within five miles. (4) At Cullings, the road forks, the right-hand branch going to Wickenburg, and the other striking more northerly, via Date Creek, to Prescott. (5) At this point roads diverge south to Phœnix and Florence, to the Vulture Mine, to Agua Fria and Cave Creek mines, east and north to Prescott, and northeast to adjacent mining districts. (6) At Prescott, roads diverge to Camp Verde and valley, with its growing settlements, to Alexandria, and other mining towns and camps; north to the Black Hills and Forest, and to the San Francisco Mountain; northwest to Mineral Park and vicinity, and almost due west to Aubry and Hardyville landings. Also east, via Camp Verde, across the Plateau to Fort Wingate, New Mexico, and thence to the present southern terminus of the Denver and Rio Grande Railroad. (7) At Smith's Mill, south of Wickenburg, a road east diverges to Camp McDowell. (8) At Phœnix, roads diverge southward, one crossing to and following the Hassayampa Creek to the Gila, others eastward, up the Salt River valley, to Marysville and Camp McDowell, while other roads strike south, direct to Maricopa Wells, the mail stage line diverging in a southeast direction to Florence.

Military Routes.

NUMBERS 1-9 include all the Routes north of the Gila River; NUMBERS 14-25 include all the routes south of the Gila River in Arizona, and the Routes from San Diego to Fort Yuma; NUMBERS 26-31 include the Routes from Arizona into New Mexico and Sonora, from Fort Whipple, A. T., to Fort Wingate, New Mexico, and the Routes from Camp Pinal and Camp Apache.

☞ When there is more than one route, the distance on the usual route is marked with an Asterisk (*). There is a difference of ten per cent. less, as a rule, on the roads and routes surveyed by the military authorities, as compared with those given by the stage companies and mail contractors.

No.	*Route.*	*Distance.*
1	Camp Mojave to Willow Grove	79.78
2	Camp Willow Grove to Fort Whipple (PRESCOTT)	84.88
3	Fort Whipple to Camp Verde	38.59
4	Fort Whipple to Date Creek	59.65
5	Ehrenberg to Camp Colorado (Indian Reservation)	45.50
6	Ehrenberg to Date Creek	*130.22 137.17
7	Ehrenberg to Wickenburg, A. T.	131.32
8	Camp Colorado to Date Creek	*175.88 84.00
9	Date Creek to Camp McDowell	*109.83 126.18
10	Date Creek to Maricopa Wells	101.05
11	Wickenburg to Fort Whipple, (PRESCOTT) via trail	55.00
12	Wickenburg to Camp McDowell, via trail	65.00
13	Camp McDowell to Fort Whipple (PRESCOTT)	109.85
14	Camp McDowell to Camp Reno	33.00
15	Camp Reno to Camp Verde	90.00
16	Camp McDowell to Maricopa Wells	44.81
17	Camp McDowell to Camp Grant	106.17
18	San Diego to Fort Yuma, Cal	*191.61 229.05
19	Fort Yuma, Cal., to Maricopa Wells (YUMA)	176.73
20	Maricopa Wells to Camp Grant	90.78
21	Camp Grant to Camp Goodwin	153.46
22	Camp Grant to Camp Bowie	135.34
23	Maricopa Wells to Tucson (Camp Lowell)	98.01
24	Camp Grant to TUCSON (Camp Lowell)	52.06
25	TUCSON (Camp Lowell) to Camp Goodwin	149.55
26	TUCSON (Camp Lowell) to Camp Bowie	105.36
27	TUCSON (Camp Lowell) to Camp Crittenden (east of Santa Rita)	*50.78 57.36
28	Camp Crittenden to Camp Bowie	97.55
29	Camp Bowie to Camp Goodwin	*88.00 99.00
30	Camp Bowie, A. T., to Fort Cummings	114.00
31	TUCSON (Camp Lowell) A. T., to Guaymas, Mexico	350.78
32	Camp Wallen, (abandoned) A. T., to Guaymas, Mexico	317.50
33	TUCSON, (Camp Lowell) A. T., to La Libertad, Mexico	*225.23 236.97
34	TUCSON, (Camp Lowell) A. T., to Lobos, Mexico	213.64
35	Camp Pinal to Tucson (Camp Lowell)	114.63
36	Camp Pinal to Fort Whipple	243.97
37	Camp Pinal to Camp Grant	67.65
38	Camp Apache to Tucson (Camp Lowell)	221.55
39	Camp Apache to Maricopa Wells	316.24
40	Camp Apache to Fort Whipple	268.00
41	Fort Whipple (PRESCOTT) to Fort Wingate, N. M.	285.76

From Yuma.

To	Miles.	Route.
Camp Final, disused	260	Via Florence, on the Overland Road.
Camp Apache	497	Via both Tucson and via Camp Grant, 494 miles.
Camp Bowie	380	
Camp Colorado, disused	185	Via Ehrenberg and then by river road, 45 miles.
Camp Colorado, "	315	Via river steamer.
Camp Crittenden "	396	Via Maricopa Wells, Tucson and Davidson's Springs.
Date Creek, "	278	Via Ehrenberg or via Camp Colorado.
Camp Goodwin "	425	
Camp Grant	288	Via Maricopa Wells and Florence or Tucson.
Tucson	275	Via direct from Maricopa, by stage road 300 miles.
Camp McDowell	222	Via overland road to Maricopa Wells.
Camp Mojave	303	By river steamer.
Camp Reno, disused	255	Via Camp Verde.
Camp Verde	377	Via overland road to Maricopa Wells, and thence via Phœnix and Camp McDowell.
Prescott	338	Via Oatman Flat and Wickenburg.
Ehrenberg	140	By river steamer.
Maricopa Wells	177	By regular stage route, 191 miles.
La Paz	130	By river steamer.
Guaymas, Mexico	680	Via Tucson.
La Libertad, Mexico	500	Via Tucson.
Lobos, Mexico	480	
Tubac	321	Via Maricopa Wells direct to Tucson, regular stage route 340 ms.
Castle Dome Mills	12	
" Mines	22	
" Landing	22	By river steamer.
Sonora Line	50	" "
Eureka		" "
Landing		" "
Aubry		" "
Hardyville		" "
Callville		" "

From Prescott.

To	Miles.	To	Miles.
Camp Final, disused	244	Camp Toll Gate, disused	30
Camp Apache	401	Camp Verde	50
Camp Bowie	364	Fort Cummings, N. M.	470
Camp Colorado, disused	236	Fort Yuma, Cal. (Yuma, A. T.)	338
Camp Crittenden "	310	Ehrenberg, A. T.	190
Camp Date Creek, "	60	Maricopa Wells	161
Camp Goodwin, "	406	Guaymas, Mexico	610
Camp Grant, A. T	252	La Libertad, Mexico	484
Camp Lowell, (Tucson)	250	Lobos, Mexico	493
Camp McDowell	170	San Diego, Cal	550
Camp Mojave	165	Tubac	360
Camp Reno, disused	206	Fort Wingate, N. M	298

Camp Mojave to Willow Grove, A. T.

To	*Miles.*	*Miles.*	*Description.*
Hardyville	6	6	Village; sandy road.
Alexander's Camp	2	8	Water and wood; no grass.
First Water, Union Pass	12	20	Water; grass scarce; no wood; no camping ground.
Union Pass (Spring)	1	21	Water; no wood or grass; road up hill; no camping ground.
Coyote Spring	16	38	Water; grass scarce; wood.
Beale's Spring	1	39	Another spring ½ mile beyond; very good water.
Hualpais Spring	14	54	Half a mile to right of road; water bad; good grass.
Tanks	12	67	Filled with sand; no water or wood.
Cottonwood	7	75	Water, grass and wood.
WILLOW GROVE	4	81	With the fractions added.

1½ miles beyond Beale's Spring, where road crosses Sandy Wash, there is permanent and good water, ½ mile to right of road, in the Wash, grass abundant; good camping ground. Wood near by, ½ mile to left of road. Up the Wash are large bodies of good water.

3 miles before reaching Hualpais Spring, just after crossing Big Wash, good permanent water; grass and wood 1½ miles to right of road; good road nearly to the water. In coming from Willow Grove to Camp Mojave, in order to reach this camping ground turn to left 3 miles after leaving Hualpais Spring. Important camping ground, used by trains.

Willow Grove to Prescott, A. T.

To	*Miles.*	*Miles.*	*Description.*
Fort Rock	9	9	Ranch. Water, grass and wood. Road generally good.
Camp near Muddy Cañon	11	20	Water in cañon 300 yards to right of road; wood abundant; road good.
Anvil Rock	4	24	Water and grass.
Oaks and Willows	9	33	Water, grass and wood. Road generally good.
Old Tull Gate	9	42	Abandoned. Road hilly, otherwise good.
Roblee's (Ranch)	3	45	Water, grass and wood.
TOLL GATE (Ranch) Camp Hualpai	1	46	Water and wood abundant. Road as above.
Williamson's Valley	15	62	Water and grass; no wood. Road excellent.
Lee's Ranch	13	75	Water, grass and wood. Road excellent.
PRESCOTT	11	86	Road excellent.

Three miles beyond Camp near Muddy Cañon is an old government camping ground, with water all the year; wood and grass abundant. New road forks to the left, one mile beyond Camp. Two miles further is the Camp opposite the above mentioned water, one-fourth mile to right of road. Present camping ground well marked.

This new road intersects old road one mile before reaching Anvil Rock; is smooth, and avoids the rocky hills on the old road, now very difficult for loaded teams. Both roads are boggy in winter.

Prescott (Fort Whipple) to Camp Verde, A. T. Route 1.

To	Miles.	Miles.	Description.
*Lurty's Ranch	11	11	Water and grass; wood scarce. Good road.
Ash Creek	9	21	Water permanent; grazing tolerably fair; wood scarce.
Cienega	7	28	Water permanent; grazing excellent; wood close by spring.
Summit Grief Hill	4	32	Water to right of road one mile before reaching Summit except in dry season; grazing good; wood plenty.
CAMP VERDE	5	38	Road good; first mile steep descent.

*The road forking to the right at this place leads to Agua Fria Ranch, distance 4 miles; from Agua Fria Ranch to Ash Creek by a direct road the distance is 7.80 miles.

The direct road from Lurty's cannot be used for supply trains, which all go by Bower's Ranch, making the distance from Fort Whipple to Camp Verde 40.67 miles.

Prescott, (Fort Whipple) to Camp Verde, A. T. Route 2.

To	Miles.	Miles.	Description.
Lurty's Ranch	14	14	Via "Point of Rocks." Water and grass; wood scarce; road good.
New Road to Camp McDowell	6	20	
Ash Creek	3	23	Water permanent; grazing fair; wood scarce.
Government Saw Mill	6	30	
CAMP VERDE	16	46	Good road.

Captain Foster, Assistant Quartermaster, reported this road in 1876 as the only practicable one for loaded wagons, between Fort Whipple and Camp Verde.

Prescott to Date Creek, A. T.

To	Miles.	Miles.	Description.
Lee's Ranch	11	11	Water, grass and wood. Right hand road to Camp Mojave.
Tonto Spring	9	20.60	Water to right of road ½ mile distant. Good camping ground.
Dickson's Ranch	10	30.60	Water, grass and wood. Road good.
Ehle's Ranch	5	34.10	Water, grass and grain. Road good. Mail station; good stabling.
Uncle Bob's	5	38.79	Water, grass and grain.
James' Camp	3	42.79	Water, part of year; grass good. Road bad and dangerous.
Willow Spring	4	47.71	Water ½ mile to left of road; grass good; wood scarce.
Soldiers' Holes	6	53.71	Water in rainy season.
DATE CREEK	5	60.00	Road mostly good.

By a rough trail from Fort Whipple over Granite Mountains to Ehle's Ranch (Skull Valley) the distance is estimated at eighteen miles. There is another trail leading over this range entering Skull Valley at its upper end, (Dickson's Ranch) three and one-half miles from Ehle's. This trail is three or four miles longer than the other, but is not so rough. In winter the short trail (so-called) is often obstructed by snow. These trails are used by the "Mail Carrier."

Camp Apache to Prescott, A. T.

To	*Miles.*	*Miles.*	*Description.*
Tank	18	18	
Spring	5	23	
Forks of Road	8	31	Right fork to Zuni, N. M.
Jo. N.'s Camp	18	49	
Silver Spring	6	55	
Stoneman's Camp	6	61	
Shevelon's fork of Color'do	7	68	After crossing, take right fork of road.
Crossing of Little Colorado	28	96	
Sunset Crossing	33	129	
Tank	18	147	
Jo. N.'s Camp	20	167	
Sauce Spring	8	175	
Stoneman's Lake	13	188	
Beaver Creek	18	206	
Camp Verde	18	224	
Prescott	44	268	

Dos Palmas (S. P. R. R.) to Ehrenberg, A. T.

To	*Miles.*	*Miles.*	*Description.*
*Dos Palmas (S. P. R. R.)			
Canon Springs	11	190	Water and wood; little grass. Good road.
Chuc-a-walla (Station)	34	224	Water and wood. Good road.
Laguna	30	254	Water and wood; little grass; heavy sand.
Willow Springs	7	261	Water, grass and wood. Good road.
Bradshaw's Ferry (Ranch)	12	273	Water and wood. Good road.
†Ehrenberg	3	276	Sandy road.

*California and Arizona stages to Prescott leave this station.

†From Ehrenberg there is a road up the Colorado River to Camp Colorado, 45.50 miles.

Irrigated lands in Southern Arizona will readily produce two crops of grain each year, and several of alfalfa. Some lands, belonging to the Pima Indians, as well as fields about Tucson and the ranches of the Santa Cruz and San Pedro Valleys, are known to have been in continuous cultivation for at least from two to three hundred years. Water fertilizes and restores the soil. The valley of the Gila, under analysis, shows more phosphorates and other fertilizers than that of the Nile.

A sand storm on the mesas of Southern Arizona is not a pleasant affair to encounter. If caught in one on horse-back or afoot, imitate the animals, put your face close to the ground and turn your back to the blast.

Ehrenberg to Camp McDowell, A. T., via Date Creek.

To	Miles.	Miles.	Description.	
Tyson's (Los Posas)	25	25	Good water; hay and grain.	
Desert Station	26	51	Good water; hay and grain.	
Flint's	19	70	Good water and grass.	
McMullen's	4	74	Old road branches here by Martinez's Cañon.	Road west of Date Creek Mountain.
Callen's	10	85	Good water and grass.	
Date Creek Crossing	36	121	Good water and grass.	
DATE CREEK	9	130		
Martinez's Cañon	7	7	Water, grass and wood; road boggy in wet season. Right fork to Ehrenberg.	
Vulture Mill	19	26	Last six miles of road sandy.	
*WICKENBURG	1	27	Settlement.	
†Camp on Hassyampa	6	33	Water (except in very dry seasons), grass and wood.	
Road leaves Hassyampa	3	36	Quicksands in Hassyampa sometimes impassable. (See Note.)	
Mud Tanks	12	48	Water in rainy season.	
Point of Mountain	7	55	Permanent water in White Tanks, 1½ miles to right of road.	
Forks of Road		56	Right fork to Salinas Lower Crossing.	
Crossing of Agua Frio Ranch	9	65		
Phœnix (Swelling's R'ch)	19	85	Settlement.	
Acequia	1	86		
Forks of Road	12	98	Right fork to Maricopa Wells and Camp Grant.	
CAMP MCDOWELL	11	110		

* The road runs along the bed of the stream for a part of the way; when the river is high quicksands are troublesome, and the road is sometimes impassable; whenever this is the case, the route is via the Vulture Mine, by which the distance is increased 18 miles.

From Wickenburg to Prescott, via Walnut Grove, the distance, by a very rough trail, is estimated at 55 miles. Ranch at Walnut Grove, half way.

From Wickenburg to Camp McDowell direct, by trail, the distance is estimated at 65 miles.

† There is a road from this point down the Hassyampa to Burke's Station on the road between Fort Yuma and Maricopa Wells, with the following Camps:—Gila Bend, 40 miles; Cottonwoods, 25 miles; Camp opposite Oatman's Flat, 10 miles; Agua Caliente, 16 miles; Burke's Station (fording Gila River), 5 miles—total, 96 miles. The road is quite good, (though seldom traveled) and water, grass and wood are to be found at all the above Camps.

From Date Creek to Maricopa Wells, the road is taken to Salinas Lower Crossing (78 miles), thence by the Gila Lower Crossing (17 miles) to Maricopa Wells (6 miles)—total, 102 miles. In winter, when the Salinas and Gila are too high to ford, by going about 3 miles farther up the Gila to Morgan's, advantage can be taken of a Ferry without increasing the distance to Maricopa Wells.

From Camp McDowell to Prescott, by a proposed wagon road that is opened from Prescott to Agua Frio, the distances are estimated as follows:—Camp McDowell to Agua Frio, 47½ miles; Dickson's Ranch, by newly opened road, 23 miles; Agua Frio Ranch, by old road, 18 miles; Prescott, 21 miles—total distance, 110 miles.

The road from Camp McDowell to Camp Reno has the following camping grounds:—Camp Miller, 16 miles; Camp Carroll, 4½ miles; Camp O'Connell, 4 miles; Camp Reno, 8½ miles—distance, 33 miles.

From Camp Reno to Camp Verde, by a newly opened road, it is to Camp in Green Valley, 30 miles; thence to Camp Verde, by trail, 60 miles—total distance, 90 miles.

‡ In rainy seasons, when the route by Agua Frio is impassable, it is necessary to take the right fork to Salinas Lower Crossing, (22 miles) thence up the north bank of the Salinas to Phœnix (about 23 miles)—total, 45 miles,—increasing the distance from Camp Date Creek to Camp McDowell about 16 miles.

Camp McDowell to Maricopa Wells, A. T.

To	*Miles.*	*Miles.*	*Description.*
Forks of Road	11	11	Right fork to Phœnix.
Ferry Station	2	13	Left fork to Camp Grant. Water, grass and wood. Crossing of Salinas River.
Desert Station	11	24	Well of water. Hay and grain at Station.
Morgan's Ferry	17	41	Crossing of Gila River.
MARICOPA WELLS	3	45	Stores. No grass or wood.

During the winter the Gila is usually and the Salinas occasionally, unfordable.

Camp McDowell to Camp Grant, A. T.

To	*Miles.*	*Miles.*	*Description.*
Forks of Road	11	11	Road excellent. Right fork to Phœnix.
Ferry Station	2	13	Small station; bad ford at high water.
Florence (Crossing Gila)	38	52	Good fording; Ranch ½ mile this side.
Ruggles and Ewing	3	56	Last Ranch before leaving river; good stopping place.
Junction with Sacaton R'd	4	60	Desert mesa.
Round Valley	12	73	No water, wood or grass.
Camp near Round Valley	2	75	Water ½ mile to left of road by trail.
Cottonwoods	13	89	Water ½ mile to right of road by trail; grass; wood scarce.
Junction with Tucson R'd	13	103	
CAMP GRANT	3	106	Crossing Rio San Pedro.

At Prescott, clerks receive from $50 to $125 per month, with board often thrown in; carpenters and painters, from $4 to $6 per day; masons, from $6 to $8, and in some cases, when a man is possessed of superior skill, as high as $10 per day; ranch hands, herders, cow-boys, from $25 to $50 per month, and board; common laborers, from $2 to $3 per day; domestic servants, men and women, from $25 to $40 per month; but as yet there is no great demand.

Maricopa Wells to Camp Grant, A. T.

To	*Miles.*	*Miles.*	*Description.*
Pima Villages	10	10	Store and mill.
Sweet Water	6	16	Store.
Sacaton	6	22	Store; water; grass scarce; right fork of road direct to Tucson.
Reservation, eastern boundary	7	29	
Walker's Ranch	6	35	Indian village and store.
White's Ranch	4	39	Gila; wood, hay, grain; little grass.
Junction with Camp McDowell Road	7	46	
CAMP GRANT	46	92	Crossing San Pedro.

The road from Maricopa Wells to Pima Villages is cut up with small gullies, from 1 to 4 feet deep, with steep sides, which, in rainy seasons, are muddy and troublesome.

The left fork leads up the Gila to Adamsville, 2½ miles distant, where are two stores, a mill, etc., and thence to Ruggles and Ewing's Ranch, (4 miles) where is a store; here the road intersects the road between Camps McDowell and Grant.

Camp Grant to Camp Goodwin.—In very rainy seasons it is necessary to go via Tucson, distance 202 miles. The shorter and better route, except in winter, is up the San Pedro River, 57 miles, to within 8 miles of Tres Alamos, where the left fork leads to Croton Springs, distance 25 miles, and thence to Camp Goodwin, 71 miles—total distance, 153 miles. On this road there are plenty of water, grass and wood, all along the San Pedro River.

Camp Grant to Camp Bowie.—To Croton Spring, distance 82 miles; thence to intersection with road between Tucson and Camp Bowie, distance 16 miles, and thence to Camp Bowie, 37 miles—total distance, 135 miles.

Maricopa Wells

To	*Miles.*	*Total Miles.*
Yuma	......	191
Tucson, south-east, (overland stage road)	......	109
Sacaton (en route direct to Tucson)	......	22
Blue Water " "	20	43
Picacho	13	57
Point of Mountains	24	81
Tucson	17	98
Camp Grant	......	90

This is a stage station, with stores, etc., of importance. It is the point of divergence for branch stages to Phœnix, Camp McDowell, and Camp Verde.

Fuller, in his Treatise on Silver Mines, says: "Wherever, in any part of the world, silver mines have been worked they are worked now, unless closed for war, invasion of Indians, etc. We know of no silver mines in the world that have given out." In support of this position, he instances the mines of Mexico, the old Spanish mines, (opened before Humboldt's time) the South American mines, still as productive as they were three centuries ago, mines in Hungary worked before the Christian era, the silver mines of Freiburg, opened in the 11th century, etc., nearly all now worked with unabated productiveness.

Maricopa Wells to Tucson, A. T.

(Going south direct.)

To	Miles.	Miles.	Description.
Sacaton	22	22	Left fork of road to Camp Grant.
Blue Water	20	43	Well; grass and wood plenty; station; hay and grain.
Picacho	13	57	Grass and wood plenty; no water.
Mud Tanks	15	72	Water in wet weather, wood scarce.
Point of Mountain	8	81	Wells; grass plenty, wood scarce; station, hay and grain.
Nine Mile Water	8	89	
TUCSON	8	98	Capital of Territory. Road good after passing Pima Villages.

Camp Grant to Tucson, A. T.

To	Miles.	Miles.	Description.
CAMP GRANT	......	......	Crossing of San Pedro.
Forks of Road	2	2	Wood scarce; grass. Right fork of road to Maricopa Wells.
Cañon del Oro	21	24	Water, grass, and wood plenty.
Water	5	30	Water scarce; grass and wood plenty.
Dry Camp	8	38	Water in wet weather; grass and wood plenty.
Roieta	8	47	Water in wet weather; grass and wood plenty.
TUCSON (CAMP LOWELL)	4	52	

The Rio San Pedro is sometimes impassable in winter on account of high water. The first nine miles of the road is in a cañon, level, and very sandy; the rest of the road to Cañon del Oro is hilly, ascending till near the cañon, when there is a long, steep descent. Three miles beyond Cañon del Oro the road enters the bed of a stream, usually dry; and continues in it to within a half mile of Dry Camp. At the foot of the mountains, opposite Dry Camp, say one and a half miles distant, are the ruins of an old Pueblo, where there is water all the year. The Roieta in winter is a running stream.

Tucson

To	Miles.	To	Miles.
Camp Pinal, disused	115	Camp Verde	296
Camp Apache	222	Fort Cummings, N. M.	219
Camp Bowie	105	Fort Whipple, (Prescott)	259
Camp Colorado, disused	349	Fort Yuma, Cal.	275
Camp Crittenden, "	51	Ehrenberg	303
Date Creek, "	199	Guaymas, Mexico	351
Camp Goodwin, "	150	La Libertad "	225
Camp Grant	52	Maricopa Wells	98
Camp McDowell	143	Lobos, Mexico	214
Camp Mojave	424	San Diego, Cal	467
Camp Reno, disused	176	Tubac	46
Camp Toll-Gate, "	298		

Tucson to Camp Goodwin, A. T.

To	*Miles.*	*Miles.*	*Description.*
Forks of Road	14	14	Right fork to Camps Crittenden and Wallen.
Cienega (begins)	8	23	Water and wood plenty; grass scarce. Picket post.
Mescal Ranch	6	29	
Cienega (ends)		30	
Water Hole	8	38	Water in winter; grass plenty; wood scarce. Road forks to left to Tres Alamos.
*Crossing San Pedro	12	50	Water and grass; wood scarce. Picket post.
Forks of Road to Dragoon Springs	11	62	Water plenty at spring; grass and wood plenty. Right fork to Dragoon Springs, five miles distant.
Forks of Road to Camp Bowie	3	65	Grass plenty; wood scarce; no water. Right fork to Camp Bowie.
Croton Springs	13	78	Water brackish; grass plenty; wood scarce.
Oak Grove	16	94	Springs; grass and wood plenty.
Kennedy's Wells	3	97	Water poor; grass and wood plenty.
†Arivapa Creek	15	113	Water, except in very dry season; grass and wood plenty.
Eureka Springs	1	114	Grass; wood scarce.
Spring	8	122	
‡Cottonwoods	8	131	Stream of water; grass and wood plenty. Road hilly.
CAMP GOODWIN	9	140	Road sandy and down hill.

*The road from Tucson is over a level mesa till it descends into a cañon, where the Cienega begins. There are several steep hills in the next few miles.

The banks of the San Pedro are high and steep, and about ten yards apart.

†In winter it is necessary to take the right fork to avoid Eureka Springs and the Cienega, just beyond it, which are then impassable. This road joins the one by Eureka Springs about a mile beyond the spring.

‡In summer the creek is dry at this point, but water can always be found by descending the creek half a mile.

Tucson to Camp Bowie, A. T.

To	*Miles.*	*Miles.*	*Description.*
Fork to Camp Goodwin	65	65	Left fork to Camp Goodwin.
*Junction of Road from Camp Crittenden	3	68	
Sulphur Springs	12	80	Water brackish; grass and wood scarce.
CAMP BOWIE	24	105	

*Half a mile further the road forks to the left, to Camp Goodwin.

The grasses in Arizona nearly all come up from the root, unlike those of California, which grow from the seed. Therefore, in Arizona, if there should be a year without rain, stock would not die of starvation. The nutritious gramma grass does not appear to run to seed at all.

Tucson to Camp Crittenden, A. T.

To	*Miles.*	*Miles.*	*Description.*
Forks of Road	14	14	Left fork to Camp Bowie.
Davidson's Spring	12	26	
Camp near Davidson's Spring	1	28	
Mescal Ranch	10	39	Left fork to Camp Wallen, (abandoned) distance twenty and a half miles. Fine country, grazing, water, and timber in abundance.
Road to Cienegas	1	40	
Junction of road from Wallen	7	48	
CAMP CRITTENDEN	2	50	

Tucson (via Tubac) to Camp Crittenden.

To	*Miles.*	*Miles.*	*Description.*
San Xavier del Bac	8	8	Settlement of Papagos Indians. Old mission church.
La Punta de Agua	3	11	Ranch.
Saurita	9	20	Ranch.
*Canoé	12	32	No water in dry season; grass and wood plenty.
Tubac	13	45	Town. Point of departure for Sopori, Arivaca, Toltec Camps, Aztec District, for Santa Rita Mountains, etc.
Calabasas	12	58	Old Fort Mason.
†Smith's Ranch	3	61	
Sonoita	12	74	Vail's Ranch.
Old Fort Buchanan	12	86	Water, grass, and wood plenty.
CAMP CRITTENDEN	1	87	

*The left fork crosses the Santa Cruz at Canoé, recrossing the river near Tubac; (the measurement was made on this road). The right fork does not cross the river, and is longer.

†Just beyond Smith's Ranch, take the left fork to Camp Crittenden. The main road goes into Sonora.

Between Tubac and Smith's Ranch, there are ranches every few miles, with water, grass, and wood.

Between Sonoita and Camp Crittenden, there are several ranches with water and grass, but little wood.

Road to Tubac very hard and smooth; but very rough from there to Crittenden, through Sonoita Cañon.

Camp Crittenden to Camp Bowie, A. T.

To	*Miles.*	*Miles.*	*Description.*
Forks of Road	1	1	Left fork to Tucson.
Forks of Road	13	14	Right fork to Santa Cruz.
CAMP WALLEN (abandoned)	5	20	On Babacomori Creek.
*San Pedro Crossing	18	38	Station.
Dragoon Springs	18	56	Water, grass, and wood.
†Junction with Road	3	60	Road from Tucson.
Sulphur Springs	12	72	Water brackish; grass and wood scarce.
CAMP BOWIE	25	98	

*Left fork leads down the right bank to the middle crossing of the San Pedro River, distance 13.32 miles, thence to Camp Bowie or Tucson.

†From this point to Camp Goodwin.

Camp Bowie to Camp Goodwin, A. T.

To	*Miles.*	*Miles.*	*Description.*
*Forks of Road	6	6	Water usually; good grass. Left fork to Tank, half a mile distant.
Water Holes	30	36	Water usually; good grass, near forks, on right side of road.
First Camp on Gila River	27	63	Water; grass scarce.
Second Camp on Gila River	11	74	Water; grass scarce.
CAMP GOODWIN	14	88	

*The Tank always contains water. The road from the Tank to the Gila is over a grassy plain with no water in dry season, excepting at Water Holes, near the Junction with the old road along the Rio de Sauz. There water is usually found on the right-hand side of the road.

There is another road to Camp Goodwin, via San Simon, (seventeen and a half miles) and thence down the Rio de Sauz, joining the above road at Water Holes, (thirty-one miles) making the distance about eleven miles longer.

Tucson, A. T., to Guaymas, Mexico.

[ESTIMATED.]

To	*Miles.*	*Miles.*	*Description.*
Smith's Ranch	61	61	
Los Nogales	5	66	Water and grass; mesquite wood.
Agua Zarca	15	81	
La Casita	14	96	
Los Alisos	8	104	
IMURIS	11	115	
La Magdalena	11	127	
Santa Ana	12	139	
Bajorito	16	155	Wells and grass; mesquite wood.
Rancho Querobabi	23	178	Tanks and grass; mesquite wood.
Rancho Tabique	28	206	
Hacienda de Torreon	26	232	Water; grass scarce; mesquite wood.
Hacienda de La Labor	2	234	
Hacienda del Alamito	9	243	Water; grass plenty; mesquite wood.
HERMOSILLO	12	255	Water; no grass; mesquite wood.
Rancho de la Parza	16	271	
Rancho de la Palma	16	288	Tank; grass scarce; mesquite wood.
Rancho del Posito	8	296	
Rancho de lo Cienequito	15	312	
Rancho de la Mucho Buéno	19	331	No water; grass plenty; mesquite wood.
Rancho de la Caballo	9	340	Tank; grass plenty; mesquite wood.
GUAYMAS	11	351	

The road from Tucson to Guaymas, except 15 miles south of Calabasas, where it is heavy in wet weather, is one of the finest on the Pacific coast.

Tucson, A. T., to Port La Libertad, Mexico.

To	Miles.	Miles.	Description.
San Xavier del Bac........	8	8	Settlement of Papago Indians.
La Punta de Agua.........	2	11	Ranch.
Sahuarito, (Columbus)....	8	19	Water, grass and wood. Good road.
Roade's Ranch............	8	28	
Los Taraises.............	2	31	
Reventon, (Kitchen's Ranch)............	2	34	
Soporio Rancho...........	5	39	
Mina Colorado	11	51	
ARIVACA..................	7	58	
Los Alamos (Old Arivaca)	1	59	
Covodepe Cuesta (Mexico)	6	65	
Spring in bed of Arroyo ..	5	70	Water scarce; wood. Good road.
Z'Azabe..................	8	79	Water, grass and wood. Good road.
Charco de los Mesquites..	6	86	No water.
Tecalote Trail		86	
Charco...................	4	90	Water, grass and wood.
Rancheria................	2	92	Good grass.
Forks of Road............	1	93	
Forks of Road............		93	
Ascent to Mesa...........	1	94	
Tinaja, (Charco)..........	6	101	Water, grass and wood.
Los Paredones............	15	116	Water, grass and wood. Good r'd.
Jesus Maria..............	14	130	Water and wood; grass scarce. Good road.
ALTAR....................	8	139	Water and wood; grass scarce. Good road.
Dry Arroyo...............	4	143	Good road.
Road to Zepedas Ranch ..	6	149	Good road.
Foot of Hill..............	2	151	Good hard road.
Summit of Hill	1	152	
PITIQUITO................	1	153	Water, grass and wood. Good hard road.
Cienega and Caborca Ro'd	7	161	Good hard road.
Laguna Mosca.............	5	166	No water in dry season; good grass, Good hard road.
Bajia de Aquituna........	6	172	Wood and grass; no water. Good level road,
El Zanjon (dry arroyo)...	2	175	Wood and grass. Good road.
Tinaje del Viejo	7	182	Water.
Angostura Pass...........	7	190	Water, grass and wood. Good hard road.
Picu	11	201	Water, grass and wood. Good hard road.
Pozo de los Cristolas		201	
Charco de los Papagos....	1	202	
Tinaja del Tule...........	4	206	Very little water or grass.
Derisadero Prieto.........	4	211	Wood; no grass. Good hard road.
Point where Gulf is first seen	1	212	
PORT OF LA LIBERTAD	13	226	Bad road.

Heavy blankets are a necessity in Arizona; the nights are always cool, even in the height of the "heated term." Woolen undergarments are desirable at all times.

Fort Wingate, N. M., to Prescott, A. T., via Camp Verde, A. T.

	Miles.	*Yards.*	*Miles.*	*Yards.*	*Description.*
FT. WINGATE, Spring Cr'k Crossing ...	2	1010	2	1010	Crossed by bridge, water plenty, wood on hills.
Spring	7	738	9	1748	Spring close to road on south side, at base rocky bluff, water bad, wood plenty, and good grazing, road sandy for short distance.
Bridge over Defiance road	3	496	13	484	Bridge across Rio Puerco of the West; water good and grass plenty.
Camp on Rio Puerco	3	525	16	1000	Water muddy, plenty wood, good grass.
Quirina Cañon......	19	323	35	1332	Rio Puerco almost washing away the road. Bluffs on left bank very steep and abrupt.
Camp on Rio Puerco	5	442	41	14	Camp a short distance off road.
Crossing of Rio Puerco.	12	659	53	673	Half a mile east of the crossing, a road leads off to the left, bed of river, quicksand, crossing fair, road good.
2d Crossing of Rio Puerco.	1	540	54	1213	Here we were unable to effect a crossing, owing to recent freshet washing away the banks, leaving them 20 feet high and abrupt; left road and crossed country, keeping from one to two miles from right bank of river. Road between crossings is sandy. The route on north side of Puerco is shortest. Distance to Carrizo Creek about 11 miles. Water in Rio Puerco, between those points, not permanent.
Camp on Rio Puerco.....	7	1345	62	798	Heavy traveling, water muddy, grass ordinarily good, greasewood abundant.
Road.........	13	834	75	1632	Traveling a little heavy; crossed some sandy Arroyos before getting on road, water in Rio Puerco.
Camp on Carrizo Creek..	5	31	80	1663	Water obtained by digging, wood scarce, road and grass good.
Lithodendron Creek......	13	1666	94	1569	A wide sandy bed, no water, crossing in dry weather good, but very difficult when there is water, quicksands, road good, a steep hill on east side. South of the crossing, the Rio Puerco becomes a wide, dry, sandy bed.
Camp on Little Colorado River....	16	1216	111	1025	Water and grass abundant and good, plenty of wood, road good. About five miles up the Puerco, water was found in holes.
Camp on Little Colorado River...	19	1020	131	285	Half a mile from road to river, plenty wood and water, grass good, road good.
Camp at Sunset Crossing Little Colorado River.	14	493	145	778	Plenty wood and water, no grass near crossing, road good to Cottonwood Fork, which empties into the Little Colorado,

Fort Wingate, N. M., to Prescott, A. T., via Camp Verde, A. T.

Continued.

	Miles.	Yards.	Miles.	Yards.	Description.
					near Sunset Crossing. Cottonwood Fork has a delta, and in time of freshet overflows the valley for several miles, rendering it impassable. Sunset Crossing is not passable in time of melting snows without the aid of a raft.
Camp at Sunset Pass, on Big Dry Fork	18	669	163	1447	Road gradually up grade, but good traveling, permanent water in tanks in bed of creek for about four miles, in cañon plenty wood, water, and grass.
Camp on a lake of snow water	21	42	184	1489	Four miles from Camp on Big Dry Fork, the road runs through thick cedar to Jarvis Pass, which is 14 miles from Sunset Pass. Road good to Jarvis Pass, thence stony; plenty of cedar on lake.
Simpkins' Spring......	7	1681	192	1411	Spring 100 yards north of road, (trees blazed) good water, grass ordinarily good, thick heavy pine, road stony and up grade.
Stoneman's Lake.......	10	859	203	510	Is about 4½ miles in circumference, circular, an abundance of permanent water. Lake inclosed by bluffs about 400 feet high, thick heavy pine, good grass, very difficult to get water. The road leads through the Mogollon Mountains from Simpkins' Spring to Stoneman's Lake. In the spring of the year, the road through the mountains is perfectly saturated with water, very miry, and impassable for heavy-loaded wagons. Pine timber is thick and heavy on mountains.
Bartlet's Tank.......	7	666	210	1173	Tank 400 yards north of road. Four miles from Stoneman's Lake, the road leads through thick cedar, and becomes very rocky. Two and a half miles southwest of lake are two small creeks with wood and grass, but no permanent water.
Beaver Creek Crossing...	11	272	221	1445	The descent to the creek is very steep and abrupt. At base of hill, a trail leads southward to Camp Verde, which cuts off about 9 miles. Road up to this point leads through thick cedar, and is very rocky, thence good. Beaver Creek is a large stream of permanent water, rocky bed, banks low, crossing good, grass fair, plenty wood.
Rio Verde....	12	1121	234	806	Road good for 10 miles, thence hilly to crossing. Rio Verde 80 feet wide, gravel bed, good water, banks low, crossing good, scattered cottonwood on banks. A road leads up the left bank to the Indian Reservation. On right bank, a right-hand road direct to Prescott.

Fort Wingate, N. M., to Prescott, A. T., via Camp Verde, A. T.
Continued.

	Miles.	*Yards.*	*Miles.*	*Yards.*	*Description.*
Camp Verde.	6	1673	241	719	Road good.
Wild Cherry Creek	12	1412	254	371	Returned on road 4 miles, thence over foothills of Verde Mountains for 5 miles, thence ascend and descend mountains to Wild Cherry Creek. The ascent is very steep, but gradual; the descent is more abrupt; road in good order. Wild Cherry Creek is a running stream of permanent water. Timber and grass abundant.
Gayetty's Ranch......	3	....	257	371	Ranch and station on left of road.
Ash Creek...	6	233	263	604	Permanent water in holes south of crossing, banks low, rocky bed, crossing good, plenty wood and grass, road a little hilly. Three miles east is the junction of Grief Hill Road.
1st Crossing of Lynx Creek......	7	1345	271	189	Ranch at crossing, creek dry, water in well, good grass, wood at ranch.
2d Crossing of Lynx Creek	8	1002	279	1191	Permanent water, ranch on west bank, scattered cottonwood, good grass, low banks, rocky bed, good crossing. Steep hill on either side.
FT. WHIPPLE.	6	155	285	1346	On right bank of Granite Creek, road hilly.

Roads and Distances from the Colorado River (en route from Utah) South to Prescott.

No. I. FROM COLORADO CROSSING, VIA TRUXTON SPRINGS.

To	*Miles.*	*Total Miles.*	*Altitude.*	*Description.*
Tinnahkah Springs....	21	21	4080.0	Small springs; bunch-grass; wood.
Attoovah (or Cañon) Springs..............	14	35	....	Spring in cañon; bunch-grass; cedar trees.
New Creek of Ives, or Pahroach Springs....	14	49	....	Good camping-grounds; plenty wood, water and grass.
Truxton Springs.......	16	65	3885.5	Bunch-grass through sage-brush; water and wood.
Old Camp Willow Grove..............	25	90	....	Wood, water and grass.
Fort Rock...............	15	105	....	Good water; no grass; little wood.
Oaks and Willows	27	132	....	Water, wood and grass.
Old Camp Hualapais..	9	141	5321.9	Good water and grass; plenty wood.
Toll-gate in Williamson's Valley.........	16	157	....	Water and wood; little grass.
PRESCOTT...............	23	180	5318.0	Water and grass.

Roads and Distances from the Colorado River South to Prescott.

No. II. FROM MOUTH OF RIO VIRGEN, VIA VIRGIN AND BEALE'S SPRINGS.

To	*Miles.*	*Total Miles.*	*Altitude.*	*Description.*
Mountain Spring	41	41	5500.8	Water alkaline; little bunch-grass; wood.
Chloride City..........	14	55	....	Water brackish; little grass.
Mineral Park..........	7	62	....	Water alkaline; wood and grass at small distance from town.
Cerbat..................	6	68	....	Water and wood; very little grass.
Beale's Springs.........	9	77	....	Water and wood; grass some distance from camp.
Hualapais Springs......	16	93	....	Good water, wood and grass.
Old Camp Willow Grove (Cottonwood).	20	113	4170.0	Good water, wood and grass.
Fort Rock	15	128	....	Good water; no grass; little wood.
Camp Hualapais.......	36	164	5321.9	Good water, wood and grass.
Toll-gate	16	180	....	Good water and wood; little grass.
PRESCOTT...............	23	203	5318.0	Good water and grass.

No. III. FROM MOQUI-PUEBLOS TRAIL, VIA MOUTH OF PARIA CREEK.

To	*Miles.*	*Total Miles.*	*Altitude.*	*Description.*
Moen-copie Creek......	11	11	4984.1	From map; distance probably too small.
Colorado Chiquito	12	23	....	From map; distance probably too small.
Cascades................	58	81	....	From map; water alkaline; wood; grass scarce on lava *débris* a few miles south of river.
Wagon road	11	92	....	Plenty of wood and grass.
Cosnino Tanks.........	4	96	6244.1	Wood and excellent grass; water said to exist in tanks all the year.
Antelope Springs......	24	120	8065.1	Good grass and wood anywhere.
Volunteer Spring	11	133	7106.4	Good wood, water and grass.
Spring south of Bill Williams' Mountain	27	160	5526.6	Good wood, water and grass.
Rattlesnake Cañon ...	15	175	4600.0	Wood scarce; good water; bunch-grass.
Postal's Ranch.........	14	189	....	Good water; wood and grass poor.
PRESCOTT...............	22	211	5318.0	Plenty water and wood.

Road from Virgin to Mountain Spring generally good.

From Moqui-Pueblos trail to Cascades and from Cosnino Tanks distances were taken from map, and for road distances (though correction was made) are probably too small.

The trail used from Cascades on Colorado Chiquito to wagon road is perfectly practicable for wagon; hence good mail-road to Prescott.

Good camping ground at crossing of Muddy Cañon, between Fort Rock and Oaks and Willows.

Road from Mineral Park good.

Road from Cerbat sandy.

Road from Beale's Spring good; abandoned military post.

Road from Cottonwoods good. Mineral Park and Cerbat are both situated about one mile east of road from Chloride City to Beale's Spring.

To Navajo Springs, good made road round springs; excellent to Limestone Pockets and beyond, till it passes divide, when it becomes sandy.

From Navajo Springs to Moqui-Pueblos trail, good road, following arroyo.

Camp Wallen, (abandoned) A. T., to Guaymas, Mexico.

[ESTIMATED.]

To	*Miles.*	*Miles.*	*Description.*
CAMP WALLEN			Babocomori Ranch and Settlement.
Mescal Ranch	9	9	Water, grass and wood plenty.
San Rafael	18	27	Water and grass plenty; no wood.
Santa Cruz	8	35	Town; no wood.
San Lazaro	9	44	Water, grass and wood plenty.
Spring of water	12	56	
Cocospera	2	58	
Mouth of Cañon	6	64	
Babasaqui	12	76	Ranch.
Imeritz	3	79	Town.
Ternate	6	85	Flour mill. Water, grass and wood plenty.
La Magdalena	9	94	Town.
GUAYMAS	223	317	

Tucson

To	*Miles.*	*To*	*Miles.*
Yuma (W by N)	300	Salero House, Santa Rita (S by E	60
Florence (N)	63	Toltec C'mp, Aztec dist. (S by E)	65
Silver City (E)	118	Sonoita, mill-sites, (S by E)	70
Globe City (N)	138	Oro Blanco, Ostrich mine, etc. (SW)	85
San Carlos (N by E)	175	Tres Alamos (E)	50
Phœnix (N by W)	125	Davidson Spring (SE)	......
Copper Mines, Young America, etc. (W)	50	Old Camp Crittenden (SE)	......
Maricopa Wells, (direct N by W)	98	Babocomori Ranch, Camp Wallen (SE)	......
Tubac (S)	46	Pategonia Mt'ns, Mowry Mine (SE)	85
Tumacacori (S)	49	Camp Hauchachi, near Old Presido, San Pedro (SE)	......
Sonora line (S.)	75	Pueblo Viejo (NE)	150
Cabasas (S)	......	San Carlos (NE)	160
Arivaca (S by W)	......		
Hacienda del Santa Rita, Tyndall (S by E)	59		

Tucson to Camp Crittenden (east slope of Santa Rita Range) via Davidson's.

	Miles.	*Total Miles.*
Forks of Road (left fork to Bowie)	14	......
Davidson's Spring	12	26
Mescal Ranch (left fork to Camp Wallen and Babocomori)	13	39
Road to Cienaga	2	41
CAMP CRITTENDEN	9	50

The Same, via Tubac.

	Miles.	*Total Miles.*
Tucson to San Xavier del Bac (Papago Indian Reservation)	9	......
La Punta de Aqua Ranch	2	11
Saurita Ranch	9	20
Canoé (no water in dry season, grass and wood abundant)	12	32
TUBAC	13	45
Calabasas	13	58
Smith's Ranch (main road to Sonora; left fork to Crittenden)	3	61
SONOITA (Aztec and Tubac mill-sites, ranch, and saw-mill)	13	74
CAMP CRITTENDEN	13	87

Prescott

To	*Miles.*	*To*	*Miles.*
Nephi, Utah, U. South'n R. R. (N)	500	Silver King (E of S)	190
Fort Wingate, N. M. (E)	286	Chino Valley (N)	22
Present Terminus of Denver & Rio Grande N. G. R. R. (E)	540	Aqua Fria Valley (E)	15
Clifton, Longfellow Copper Mines, via Mogollon Plateau (E). Estimated	320	Camp Verde (E)	42
Wickenburg (S)	62	Montezuma Wells (N of E)	55
Phœnix (S. by E)	142	San Francisco Mt'n (N E)	85
Florence (S by E)	192	" " Forest (NE)	65
Tucson (S by E)	267	Black Cañon (SE)	52
Tubac (S by E)	313	Alexandria, Peck Mill (S)	7
Camp Bowie (E by S)	392	Mill on the Hassayampa (S)	10
Ehrenberg (SW)	213	Walnut Grove, mill, etc. (S)	17
		Colorado Chiquito, Sunset Crossing, (N of E)	132
		Moqui Pueblos (N of E). Est'd	180
		Stoneman's Lake (N of E)	73

Wickenburg

To	*Miles.*	*To*	
Vulture Mills (N)	1	Lambley's (S)	8
Smith's (S)	15	Cave Creek Mines (N by E)	40
Vulture Mine (SE)	14	Camp McDowell (SE)	65
Aqua Fria (S)	43		

From Tubac.

(Principal point in the Santa Cruz Valley, Santa Rita mining region.)

To	Miles.	Total Miles.
Tucson	45	
Tumacacori Mission (King's)	3	3
Old Hacienda del Santa Rita	9	12
TOLTEC CAMP, Aztec District	9	12
Sonoita, Aztec and Tubac Mill-sites	5½	17½
" via Smith's Ranch		29
San Xavier del Bac		36
Revanton Ranch		6
Sopori		10
Arivaca		17
Calabasas		15
Cerro—Colorado District		22
Patagonia Mountains (Mowry Mines)		48
Fresnal		65
Ajo Copper Mines		135
Aliza Pass (Baboquivera Peak). Estimated		30
Canabi (Old Papago Country) "		60
Papago Ranch (Sonora)		90
" " (A. T.) by way of the Mexican Papago Ranch		113
Cayote Springs		45
Culjota		72
Cholla		90
Saguarza		96
Santa Rosa		75
Pirigua		92
Sonoita (Sonora, by way of Old Papago Ranch)		160
St. Domingo (on Sonora line)		175
Camp Crittenden		42
" Wallen (Babocomori Ranch)		63
Camp Bowie (via Camp Crittenden)		130
Florence (via Tucson)		108
Yuma (via Tucson)		345
SAN FRANCISCO (via Yuma, Stage & S. P. R. R.)		1,065
Phœnix (via Florence)		157
Wickenburg (via Phœnix)		222
Ehrenberg (via Wickenburg)		349
El Paso, Texas, (via Tucson)		445
Mesilla, New Mexico, (via Tucson)		394
St. Louis (via N. M. Stage and Ks. R. Rds.)		1,778
Austin, Texas, (via El Paso)		1,006
Mexican towns (via Santa Cruz Valley):		
Magdalena		81
Santa Cruz		54
Altar		95
Hermosillo		220
Lobos*		300
Guaymas*		229

* [illegible]ts in Sonora, on the Gulf of California.

Ehrenberg to	Miles.
Wi[illegible]enberg (E)	131
Pr[illegible]scott (E)	82

Mineral Park, Mojave County,

To	*Miles.*	*To*	*Miles.*
Hardyville, Colorado River (S by W)............	35	Hackberry Mine (E)..........	35
Cerbat, village (S)...........	6	Haulapai Mt'ns (SE)..........	60
McCracken Mine, Owen Dist. (S.)	100	" Camp (E)..........	103
Greenwood, mills, village, etc. (E of S)............	100	Williamson's Valley (E)......	121
		PRESCOTT (S. E)............	141

Phœnix

To	*Miles.*	*To*	*Miles.*
Wickenburg (N)............	60	Ruins, near La Tempe (E by S)............	16
Florence (S)............	50	House's Well (S)............	20
Maricopa Wells (SW).........	35	Marysville (E)............	18
Camp McDowell (E).........	35	Mount McDowell (E by N)...	20
East Phœnix (E)............	4	Placers, Superstition Mt'ns (E by S)............	40
Ruins, north of river (E)......	4		
Hayden (E by S)............	9		

Florence

To	*Miles.*	*To*	*Miles.*
Silver King, mine and mills, Pioneer Dist. (NE)..........	35	Maricopa Villages (W by N)..	42
Globe City (G. D.) Pinal Mt'ns (NE)............	75	Maricopa Wells............	46
Wheatfield, mines and furnaces (NE)............	87	Tucson (SW)............	63
Stonewall Jackson, McMillen's Camp (NE)............	93	Phœnix (NW)............	50
San Carlos (NE)............	115	Wickenburg (NW)............	110
Sanford (W)............	6	Prescott (NW)............	192
Casa Grande (SW)............	12	Mineral Park (NW)............	333
Adamsville (W)............	5	Yuma (W)............	237
Pima Villages (W)............	34	Tucson (S)............	163
		Prescott (NW)............	192
		Camp Grant (E)............	50
		Silver City, N. M. (E)........	288

Railroad and Stage to Prescott.

The cheaper route to Prescott is from San Francisco via Dos Palmas, (150 miles east of Los Angeles) and stage thence through or via Ehrenburg—Dos Palmas to Prescott being about 200 miles.

Express trains leave San Francisco daily at 4 P. M.—arrive at Dos Palmas 2:10 A. M. second night.

Third class trains leave San Francisco daily at 4:30 P. M.—arrive at Dos Palmas at 2:10 P. M. third night.

Stage leaves Dos Palmas immediately after arrival of the train, every other night.

There are two rates of fare to Prescott via Dos Palmas and Ehrenburg. First class, $78.10; third class, $67.10, coin.

The most comfortable, but more expensive route, is via rail to Yuma

River steamer to Ehrenburg, and stage thence to Prescott. But this connection depends upon the running of the steamer up the river from Yuma, of which the departures are irregular. Trains leave San Francisco: first class, at 4 P. M.—arrive at Yuma second morning at 8:30 A. M.; third class, at 4:30 P. M.—arrive at Yuma third morning at 8:30 A. M.

Fare from San Francisco to Yuma: first class, $45; third class, $34.

Yuma to Ehrenburg: cabin, $15; deck, $10. Ehrenburg to Prescott, $33.

Through tickets are not issued by this route.

A daily stage connection is made from Yuma via Phœnix, by which route through tickets are sold from San Francisco to Prescott, at first class rates, $117; third class being $106.

Miscellaneous Distances.

	Miles.
Colton (S. P. R. R.) Cal., to Fort Mojave, A. T.	135
San Francisco to Yuma (S. P. R. R.)	720
St. Louis to Prescott (estimated)	1,500
St. Louis to Tucson (estimated)	1,500
St. Louis to Florence (estimated)	1,500
Fort Defiance to Prescott (estimated)	240

Papagoria Distances.

[ESTIMATED.]

Santa Rosa to Cojéta	12
Cojéta to the Gila (Pima Villages)	50
Pirigua to the Gila (Cotterell's Station)	55
Pirigua to the Sonora line	40
Pirigua to the Saucita (north)	25
Ajo Copper Mines to the Gila (Burke's)	45
Ajo Copper Mines to the Gila (Mohawk Station)	50
Sonora line, via the Cabezo Prieta, to the Gila	70
Sonora line, via the Tinajaalta, to Yuma	110

Local Distances in Yavapai County.

Prescott to Chino Valley	20
" " Agua Fria Valley	18
" " Alexandra	40
" " San Francisco Mountain	85
" " Walnut Grove	25
" " Tiger Lode and Mine	40
" " Black Cañon	60
Azltan Mill to Black Cañon	75
Peck Mine to "	100
Walnut Grove to Tiger Lode	20
" " Peck Mine	30
Camp Verde to Beaver Creek	12
" " Hassayampa	10
Clifton to Longfellow Copper Mine	7
" " Silver City, N. M	80
" " Coronado, "	16

Local Distances in Mojave County.

Summit Springs to Aubrey	50
Mineral Mine to The Needles	45
McCracken Mine to Aubrey (via Planet Mine)	30
McCracken Mine to Parker	50
Signal to McCracken Mine	8
Signal to Greenwood	4

Colorado River Distances.

	Miles.	Total Miles.
Point Isabel (Gulf of California) to Yuma		175
Yuma to Castle Dome Landing	35	210
" Ehrenberg	125	335
" William's Fork	214	424
" Mojave Cañon	232	442
" Aubrey	220	395
" Chemehuevis Landing	240	405
" Mojave	300	465
" Hardyville	312	477
" Cottonwood Island	342	507
" Callville	402	567
" Stone's Ferry	465	640

Local Distances in Pinal County.

Florence to Picket Post	25
Globe City to Pinal Creek	18

Local Distances in Pima County.

Tucson to Arivipa Cañon (N. E.)	120
Tucson to Picacho Mine (W.)	75

The famous Turquoise Mine is in New Mexico, near the Arizona line. It comprises two enormous open quarries, perhaps 200 feet in depth at the deepest point, and covering an area of several acres. They must have been produced with great labor, since there are no traces anywhere of the use of tools or gunpowder. Tradition refers these workings to a period of greater antiquity than the Spanish occupation, and declares them to have been executed by the Aztec inhabitants of the regions who preceded the present Indian races. Stone hammers have been found in these quarries, but no tools of any metal. The trachyte is seamed and fissured throughout, at small intervals, and in every direction; and there is no reason to doubt that hammers, wedges, and levers would be quite sufficient to remove the solid masses. The turquoise occurs fully in the fissures, in the form of narrow seams and plates, rarely or never exceeding the fraction of an inch in thickness. The majority of the seams now exposed show the impure green variety, which is worthless. The Pueblo Indians, like civilized people, value the light-blue turquoise only.

Stage arrives at Florence every morning at 7 A. M. from Tucson, and leaves half an hour later for Yuma; stage from Yuma arrives every evening at 6 P. M., and leaves for Tucson half an hour later. Stage to Globe City leaves every Tuesday at 8 A. M., and arrives at 8 P. M. Saturday. Phœnix and Prescott stages leave every other day at 7 A. M., and arrive alternate days at 12 midnight. Stage for Silver King leaves every Monday, Wednesday and Friday at 7 A. M., and arrives every Tuesday, Thursday and Saturday at 4 P. M.

The military-geographical surveys, up to the fall of 1876, under Lieut. Wheeler, in central and western Arizona, have covered a total area of 17,954.6 square miles, or 11,490,944 acres. Of this total, it is estimated that 25 per cent., or 4,488 square miles, being 2,875,238 acres, are fit for agricultural purposes, mostly requiring irrigation. The timber is set down at 10 per cent., or 1,149,094 acres. For grazing, the estimate is 30 per cent., and as barren, 35 per cent. The total available land in the area surveyed is thus set down at 65 per cent., being 11,670.6 square miles, or 7,469,114 acres.

Temperatures and Rainfall.

	CAMP APACHE.	FORT BOWIE.		CAMP GRANT.		CAMP LOWELL.		CAMP McDOWELL.		CAMP MOJAVE.		CAMP VERDE.		FORT WHIPPLE, (Prescott).		FORT YUMA, (Yuma-City).	
	Temperature.	Temperature.	Rainfall.	Temperature.	Rainfall.	Temperature.	Rainfall.	Temperature.	Rainfall.	Temperature.	Rainfall.	Temperature.	Rainfall.	Temperature.	Rainfall.	Temperature.	Rainfall.
	Deg.	Deg.	Inch.	Deg.	Inch.	Deg.	Inch.	Deg.	Inch.	Deg.	Inch.	Deg.	Inch.	Deg.	Inch.	Deg.	Inch.
July......	60—104	71—103	0.50	58—109	1.70	30—113	0.08	72—113	0.00	47—118	0.00	48—113	0.14	65—91	1.56	69—112	0.00
August....	66— 88	64— 97	1.34	55—102	5.20	46—104	2.73	65—108	0.56	52—116	3.80	58—102	2.52	64—85	4.78	71—106	1.00
September	52— 92	67— 99	0.01	53— 99	2.50	22—103	0.62	54—110	0.00	45—108	0.00	41— 97	0.26	50—82	0.30	59—104	0.00
October ..	28— 92	42— 96	0.03	35—100	0.46	21—101	0.00	33—108	0.00	27—105	0.00	21— 95	0.00	33—81	0.00	48—100	0.00
November	25— 81	33— 85	1.12	31— 81	3.38	30— 91	1.32	33— 99	0.21	36— 89	0.50	20— 74	0.74	29—72	0.80	46— 86	0.00
December.	6— 62	20— 70	2.02	21 — 82	1.75	25— 78	0.97	27— 83	4.70	29— 67	2.80	6— 57	3.26	10—65	2.55	39— 61	0.64
January ..	6— 68	21— 67	2.33	20— 85	1.58	19— 78	1.76	24— 83	3.10	27— 70	0.19	5— 59	2.65	17—67	5.51	37— 72	0.55
February .	10— 65	20— 67	5.40	16— 80	2.87	21— 75	1.66	18— 78	2.86	29— 69	5.00	12— 60	2.05	10—55	5.68	35— 70	0.85
March	18— 72	32— 79	1.60	28— 86	2.45	30— 79	1.19	31— 79	1.06	30— 80	0.20	10— 72	1.05	20—65	3.56	40— 82	0.20
April......	31— 88	32— 82	0.35	30— 93	0.58	34— 97	0.43	43— 97	1.30	54— 96	0.10	27— 87	1.48	34—75	1.70	45— 95	0.00
May	38— 94	48—100	0.00	30—101	0.07	42—103	0.07	43—105	0.30	63—107	0.90	34—102	0.08	41—82	0.65	50—102	0.00
June......	57—101	67—100	0.00	54—105	0.00	34—108	0.00	54—114	0.00	75—111	0.00	43—107	0.00	55—88	0.00	66—108	0.00
			14.60		22.54		10.83		14.09		13.40		14.19		27.09		3.84

At Florence, July, 1877, the thermometer stood at 100 to 115 deg.

In Gila Valley, near the mouth of San Pedro, August and September, 1876, 50 deg. at sunrise; 105 deg. at 2 P. M.; early in October, 30 deg. at sunrise—90 deg. at 2 P. M.; close of October, 15 deg. at sunrise—90 deg. at 2 P. M.

In Gila Valley, on the New Mexico and Arizona line, October 17th, 1876, at sunrise, 28 deg.—at base of mountain range, ten miles distant, 40 deg.; Oct. 18th, at sunrise, 14 deg.—4,500 feet altitude; Oct. 19th, at sunrise, 40 deg.—6,200 feet altitude.

At Mineral Peak, during June and July, 1877, the thermometer repeatedly reached 100 deg.

August 8th to 13th, 1877, 20 miles below Sunset Crossing, on the Colorado Chiquito, the thermometer stood, at sunrise, 63 to 64 deg.; at 2 P. M., 82 to 85 deg.; at sunset, 71 to 75 deg.—3,700 feet above sea level.

Table of Altitudes—Principal Points in Arizona.

PLACE.	Lat.	Long.	Altitudes above Sea Level	REMARKS.
	° ′ ″	° ′ ″		
Antelope Springs	....	....	8,065.1	
APACHE CAMP....	33 48 18.70	32 52	5,000.0	
Apache Mesa......	....	....	5,800.0	
Art-too-hah (Canon Creek)......	35 44 43.28	....	....	Bunch grass, cedars.
Beaver Creek......	34 44 02.52	....	3,671.4	
Big Hills..........	33 23 07.70	....	5,702.5	
Bill William Mt...	....	....	8,000.0	
Black Hills or Tonto Plateau......	....	....	9,000.0	Estimated.
Bonché's Fork....	34 33 08.54	....	5,820.1	
Bowie Camp......	32 10 16.02	....	4,871.6	
Bradshaw City....	....	....	7,000.0	
Cedar Creek......	34 04	....	....	
Chevelon's Fork..	....	....	4,000.0	Trb Col. Chiquito.
Chevelon's Fork, upper course....	....	....	5,200.0	Estimated.
Chirricahua Mts..	....	....	7,000.0	Estimated.
Desert Station....	32 30 08.80	....	2,135.2	
Diamond Creek...	35 45 19.11	....	1,350.4	
Disaster Rapids..	35 55 52.10	....	....	Colorado River.
Eureka Springs...	....	....	4,900.0	
FLORENCE.........	33 02 32.53	....	....	Town 1,000 inhabitants in Gila Valley, fertile.
Gila River near Camp Goodwin..	....	....	2,517.0	
Graham Peak, Mt. Graham.........	....	....	10,516.0	Nearly 6,000 feet above base.
GRANT, CAMP (new)	32 25	32 23 10	3,985.0	Suyly.
			4,753.0	Rothrowp.
			4,833.0	Wheeler Map.
			5,400.0	
Grant, Camp (old)	32 47 35	113 37 15	2,500.0	Abandoned, Jan. 1873.
Green Springs....	36 11 13.00	....	4,931.2	Little wood and water, wood in gulch.
Limestone Water Pocket..........	36 32 18.40	....	5,405.4	Little wood, grass; to right of road, water in small gulch.
LOWELL CAMP (Tucson).........	32 12	33 49	2,530.0	
McDOWELL CAMP..	33 40	111 40	1,800.0	
MINERAL PARK...	....	....	3,000.0	Approximate.
Moen-copie Cañon	36 08	....	4,984.1	
Mogollon Mesa....	....	....	7,000.0	
MOJAVE CAMP.....	35 24	114 34 40	600.0	
Navajo Spring....	36 46 19.10	....	4,410.02	Wood, grass, and water scarce.
New Creek (Ives).	35 36 51.00	....	....	Pabroach Spring; plenty of wood, water, and grass.
Nelson's Tanks...	34 46 20.42	....	6,216.0	Or Mogollon Mesa.
Oraybe..........	35 52 57.60	....	4,736.8	Moqui Village and tank near.

Table of Altitudes—*Continued.*

PLACE.	Lat.	Long.	Altitudes above Sea Level	REMARKS.
	° ′ ″	° ′ ″		
Pah-guhn Springs	36 24 51.83			
Pah-wash	35 36 51.00			New Creek of Ives.
Paria River Cañon (Great bend Col.)	36 59		3,873.5	
Peach Orchard	35 46 42.40		6,297.5	
Picacho Station	32 44 20.67		1,750.2	
Picket Post	33 17 01.27		2,669.6	
Pinal Camp	33 21 01.45			
Pinal Creek	33 32		3,112.2	
Pinal Mountains	33 23 10.24		3,925.5	
Portage Rapids	35 48 35.90			
PRESCOTT	34 29.06	35 27 30	5,318.0	
Prieto Crossing	33 33 47.30		5,332.8	
Pueblo Colorado	35 42 10.40		6,400.9	
PUEBLO VIGA	32 49 00.00		2,711.6	
Puerto River (mouth)	34 53 16.80		5,083.0	
Rattlesnake Cañon	34 55 49.83		4,600.0	
Relief Springs	35 08 34.28		5,526.6	Near Lockwood's.
San Francisco Mts. (Humphrey's Peak)			12,561.0	Forest and sheep range. Extinct crater
San Francisco Mts. average height			7,000.0	Volcanic.
San Pedro River	32 43		5,874.5	Grass, water, wood; settlements.
Santa Rita Mts			8,000.0	Water, grass, wood plenty. Camp Toltec, near Tubac.
Sierra Blanca			11,388.0	On Mexican line.
Sunset Camp	33 13 24.00		5,276.2	Colorado Chiquito.
Sunset Crossing	33.59 41.70		4,891.5	Colorado to Chiquito.
Truxton Springs	35 24 52.51		3,885.5	Bunch grass, sage brush; water good.
TUCSON			2,500.0	Town, 4,000 inhabitants.
Verde, Camp	34 33	34 57	3,500.0	
Whipple, Fort	34 29 6	35 27 30		Near Prescott.
Willow Spring			7,195.0	
Wingate, Fort, N. M	35 20	31 22	6,822.0	United States Post.
Wrightson, Mt. (Santa Rita)			10,500.0	Mining camps near.
Young's Spring	35 32 04 28			
Yuma, Fort	32 23 3	37 33 9	267.0	110 feet above river bank on bluff. Yuma city on east bank of Colorado.
Zuni Mts. (N. M.)			9,000.0	Estimated.

The surveyors for the Atchison, Topeka & Santa Fé Railroad have pressed work beyond Cimarron, New Mexico. and expect to extend their surveys as far as Tucson, Arizona, during the present winter. The building of the road, however, will depend largely upon the corporation's ability in obtaining a land (or other) subsidy from Congress.

List of all Mining Companies who have Filed their Articles o Incorporation in the Office of the Secretary of Territory t October 1st, 1877.

NAME.	Capital Stock.	No. of Shares	District.	County.	Principal Place of Business.
Arizona Chief	$10,000,000	100,000	San Francisco	Mohave.	San Francisco.
Arizona Con.	5,000,000	100,000	Peck	Yavapai	Prescott.
Athens	10,000,000	100,000	Pioneer	Pinal	San Francisco.
Bonanza King	10,000,000	100,000	Harcuoar ?	Yuma	"
Bronknow Con. M. & M.	1,800,000	18,000		Pima	"
Cedar Valley	1,000,000	10,000	Cedar Valley.	Mohave.	Mohave.
Cedar Valley G'ld	2,500,000	25,000	Greenwood	"	San Francisco,
Cerbat Con. G. & S.	4,000,000	40,000	Wallapai	"	"
Champion Con. G. & S.	4,000,000	40,000	"	"	"
Colorado River Copper & Gold.	5,000,000	50,000		Yuma	"
Coronado	60,000	600	Arizona	and	New Mexico.
Cosmopolitan	10,000	100	At large		Prescott.
Cupel & Tiger	4,900,000	49,000	Wallapai	Mohave.	San Francisco.
Daisy Deane	3,000,000	30,000	At large		"
Detroit Copper	500,000	20,000	"		Detroit, Mich.
Eureka Bonanza	10,000,000	100,000	Eureka		San Francisco.
Excelsior Silver.	10,000,000	100,000		Pinal	"
Goodwin	10,000,000	100,000	Turkey Creek	Yavapai	"
Greenwood Gold.	2,500,000	25,000	Greenwood	Mohave.	"
Haskin	10,000,000	100,000	Globe	Pinal	"
Keystone, 1 & 2, G. & S.	3,000,000	30,000	Wallapai	Mohave.	"
Lone Star G. & S.	50,000	5,000	"	"	Mohave Co.
Longfellow Copper	50,000	100	Arizona.	and	New Mexico.
May Bean	2,500,000	100,000	Peck	Yavapai	Prescott.
McCrackin Con.	20,000,000	200,000		Mohave.	San Francisco,
McMillen	10,000,000	100,000	Globe	Pinal	Santa Rosa, Cal.
Mina Madre	300,000	3,000	At large		Tucson.
Mineral Park (mill)	1,200,000	12,000	"		San Francisco.
Montour	96,000	96,000	"		"
Northern M. & M.	10,000,000	100,000	Pioneer	Pinal	"
Ostrich M. & M.	300,000	6,000		Pima	Tucson.
Peck	10,000,000	100,000	Peck	Yavapai	San Francisco.
Pima G. & S.	10,000,000	100,000		Pima	"
Pine Flat	100,000	5,000	Turkey Creek	Yavapai	Prescott.
Silver King North	10,000,000	100,000	Pioneer	Pinal	San Francisco.
Silver King South	10,000,000	100,000	"	"	"
Sixty-Three G. & S.	4,000,000	40,000	Wallapai	Mohave.	"
Tiger Silver	2,400,000	24,000	Tiger	Yavapai	"
Tip Top	480,000	48,000		"	"
Vulture	5,000,000	50,000	Wickenburg	Marico'a	New York City
Wallace	5,000,000	50,000	Peck	Yavapai	Prescott.
Wheatfield	2,400,000	240	At large		San Francisco
Zalida	2,500,000	100,000	Lynx Creek	Yavapai	Prescott.

Mining Districts in Yavapai County.

1. Aqua Fria.
2. Black Cañon.
3. Big Bug.
4. Bradshaw.
5. Goodwin.
6. Hassayampa.
7. Hum Bug.
8. Lynx Creek.
9. Mineral Point.
10. Mountain Spring.
11. Pine Grove.
12. Peck.
13. Turkey Creek.
14. Tiger.
15. Verde.
16. Wickenburg.
17. Walnut Grove.
18. Walker.
19. Weaver.

N. B.—A number of companies have also been incorporated in California and elsewhere, for the purpose of mining in Arizona.

Composition of Soils in Arizona.

(Accompanying Geological Report, Wheeler Expedition, 1875.)

	Moquis Villages.	Chevelon's Fork.	Mogollon Mesa.	San Francisco Mountains.	Rio San Pedro.	Camp Grant.	Rio Gila.
Predominating rock	Sandstone.	Sandstone.	Sandstone.	Basalt.	Granite and rhyolite.	Granite.	Basalt and rhyolite.
Sand..........	72.04	53.10	42.20	15.95	14.00	61.20	....
Silt, with some clay..........	27.96	43.55	37.98	62.97	75.40	34.07	92.26
Potassa........	0.072	0.092	0.115	0.130	0.401	0.131	0.242
Soda,..........	Traces.	0.010	Trace.	0.017	0.051	0.014	0.039
Lime	1.665	0.319	0.153	0.684	4.356	1.996	1.798
Magnesia........			0.029	Trace.	1.019	0.203	0.570
Alumina	2.327	2.559	2.013	9.729	6.850	2.304	2.311
Oxide of iron..							
Phosphoric acid	0.031	0.070	0.058	0.284	0.213	0.095	0.214
Sulphuric acid .	Trace.	Trace.	Trace.	Trace.	Trace.	0.010	Traces.
Hydroscopic water........	2.221	1.89	10.97	12.83	6.00	2.80	4.96
Chemically-bound water and organic matter........	1,529	1.46	8.84	8.25	4.51	1.93	2.76
Insoluble in hydrochloric acid	94.60	93.55	77.81	71.09	71.10	87.52	84.85

Among the secondary precious stones that have been found in Arizona are black and green tourmalines, peridots, beautiful garnets of every tint, bloodstone, jaspers and agate of every character, while fire and white opals are found in certain localities. Zircona, in crystals, very minute, of the cube form, and in masses, has been discovered. Sufficient vein matter has not been found to determine any rich deposit of fine crystals.

Tabular Statement of Indian Affairs in Arizona,

Showing Population, Products, Stock, Education, etc., on the several Reservations, including the Navajo.

Names of Agency and Reservation.	Tribes.	Population.			Number following civilized pursuits	Perc'tage of means of subsistence from		Area of Reservation.	Acres Cultivated.	Produce raised during fiscal year ending June 30, '77		Stock Owned.		Number of children at school.		Expenditure for Education.	Agent's Post Office.
		Males.	Females.	Total.		Civilized Pursuits.	Hunting, Fishing, Gathering, etc.	Acres.		Bush. Wheat.	Bush. Corn.	Horses and Mules.	Cattle.	Males.	Females.		
Colorado River	Mojaves and Chemehuevis	610	530	820	424 Mojaves	.....	.....	128,000	470	.....	.....	110	.....	.....	.....	.....	Parker, A. T.
	Hualapais*	.....	.....	600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Coahuilas*	.....	.....	150	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Cocopahs*	.....	.....	180	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moqui Pueblos	Moquis	850	850	1,700	1,200	90	10	No reservation	3,000	200	80	.....	.....	40	.....	$5,000	.....
Pimas and Maricopas	Pimas†	2,250	2,250	4,100	800	75	25	64,000	7,200	40,000	150	1,312	800	44	22	1,750	Sacaton, A. T.
	Maricopas†			400													
Papagoes	Papagoes†	2,900	3,000	5,900	850	75	25	70,400	700	2,100	500	4,800	2,500	44	50	1,200	Do.
White Mountain Reservation, San Carlos	Pinal and Arivipais Apaches	.....	.....	1,051	715	6	6	2,528,000	545	2,333	3,200	.....	.....	3	5	300	San Carlos, A. T.
	Chiricahua Apaches	.....	.....	297													
	Mojave "	.....	.....	618													
	Yuma "	.....	.....	352													
	Tonto "	.....	.....	620													
	Coyotero "	.....	.....	1,612													
	Southern‡ "	800	1,000	1,800													
Not under an agent or at reservation	Yumas	.....	.....	930	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Mohaves	.....	.....	700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo (Arizona and New Mexico)	Navajoes¶	5,852	6,016	11,868	3,000	90	.....	3,328,000	6,000	.....	51,400	15,200	1,000	17	9	500	Navajo Ag'cy Ft. Defiance, A. T.
				33,947	8,080			6,118,400	18,015		54,400	22,212	4,300	147	86	$9,250	

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* Not on reservation, but in charge of agent. † The Papago Agency has recently been consolidated with that of the Pimas and Maricopas.

‡ The Southern Apaches, consisting of the Gila, Mogollon, Mimbre, and Chiricahua Apaches, were removed from the Hot Springs Agency, in New Mexico, to the San Carlos Agency, in May, 1877, by Agent Clum.

¶ The Navajo Agency is in both Arizona and New Mexico. The Navajoes mostly live in New Mexico.

The total areas of above reservations are 9,560 square miles; tillable acres 46,000. Besides corn and wheat, 5,300 bushels of barley and oats, and [illegible] bushels of vegetables were raised; [illegible] tons hay and [illegible] cords wood were cut. The Navajoes sold [illegible] [illegible]

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Codex Dresden. Fac-simile, Royal Library. Vol. ii.

Codex Jejérvary. Fac-simile, in possession of M. F——. Vol. iii.

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Besides these authorities, files of the *Arizonian*, published at Tubac; of the *Citizen*, Tucson; the *Sentinel*, Yuma; the *Miner*, Prescott; and the *Enterprise*, of Mineral Park and Prescott; with the *Alta California* and *Evening Post*, San Francisco; have been copiously referred to. There were also reports of the signal officer in charge of U. S. Military Telegraph, of the department records, with private notes and journals of J. D. Graham, W. G. Boyle, Prof. Rickard and others, consulted during the preparation of this work.

Arizona Business Directory.

[The list is arranged according to post offices, and classified according to counties. It is not presented as an accurate and complete one, but it is the best that could be obtained, owing to the carelessness and indifference of those who should be most interested in forwarding the information solicited.]

Official Directory.

TERRITORIAL OFFICERS.

Delegate to Congress	Hiram S. Stevens
Governor	John P. Hoyt
Secretary	J. J. Gosper
Auditor	E. P. Clark
Treasurer	T. J. Butler
Surveyor-General	John Wasson
Supreme Judge, 1st District	Chief Justice French
" " 2d "	De Forest Porter
" " 3d "	C. A. Tweed
Clerk Supreme Court	Joseph B. Austin
United States District Attorney	E. B. Pomeroy
United States Marshal	W. W. Standifer
Deputy Marshal, 1st District	Wm. J. Osborn
Collector Internal Revenue	Thomas Cordis
Register U. S. Land Office, Prescott	W. N. Kelly
" " " Florence	Levi Ruggles
Receiver " " " "	C. D. Poston
" " " Prescott	George Lount

COMMISSIONERS OF DEEDS.

San Francisco:

J. H. Blood	July 17th, 1874
Ed. Chattin	January 7th, 1875
John H. B. Wilkins	February 3d, 1875
N. Proctor Smith	March 17th, 1876
A. S. Gould	April 22d, 1875

COMMISSIONERS OF DEEDS—*Continued.*

San Francisco—Continued:	
James Brooks	June 8th, 1875
R. V. Joice	June 5th, 1875
Samuel Herman	February 28th, 1876
Wm. Harney	February 12th, 1876
James H. Lawrence	June 17th, 1876
Samuel S. Murfey	June 23d, 1876
H. M. Morgan	August 1st, 1876
Frank V. Scudder	August 9th, 1876
J. E. Russel	October 13th, 1876
F. C. Wegener	December 13th, 1876
Lewis Franconi	January 26th, 1877
Holland Smith	April 9th, 1877
E. H. Long	May 1st, 1877
Henry C. Blake	May 7th, 1877
E. H. Tharp	May 3d, 1877
Charles J. Torbut	June 6th, 1877
Los Angeles:	
H. Fleishman	February 17th, 1876
San Diego:	
Michael Keating	September 5th, 1876
Sacramento:	
Ed. Cadwalader	March 16th, 1876
Alameda:	
Will. H. Burrall	January 11th, 1877
District of Columbia:	
John C. Starkweather	July 13th, 1877
Brooklyn:	
William E. Osborn	July 12th, 1875
New York:	
Herald A. Bagley	January 12th, 1874
Charles N. Anderson	July 9th, 1875
Eleazer Jackson	September 4th, 1875
Charles Nettleton	February 12th, 1876
Joseph E. Nones	January 8th, 1876
Richard M. Bruno	April 4th, 1876
Henry Bischoff	May 21st, 1877
Marion J. Merchant	May 27th, 1877
Boston:	
James B. Bell	February 9th, 1876
Ed. J. Jones	September 28th, 1877
Philadelphia:	
Francis C. Fallon	January 27th, 1877
J. Paul Diver	April 13th, 1876
H. E. Hindmarsh	April 6th, 1876
Chicago:	
Simon U. King	January 7th, 1876
Philip A. Hoyne	November 15th, 1875
C. Knobelsdorff	June 13th, 1874
New Mexico:	
Julius E. Levy	February 24th, 1876
Philip Schwarzkoft	April 22d, 1875
Georgia:	
M. R. Freeman	August 23d, 1877

NOTARIES PUBLIC.

Pima County, 14:	
T. L. Mercer	January 29th, 1877
W. J. Osborn	February 23d, 1877
Pedro Aguierre	March 7th, 1877

NOTARIES PUBLIC—*Continued*.

Pima County—Continued:	
B. H. Hereford	March 9th, 1877
W. J. Ross	July 26th, 1877
H. B. Jones	November 1st, 1873
J. E. McCaffrey	January 26th, 1874
Hugh Farley	November 19th, 1874
Ed. A. Yerkes	March 19th, 1876
George Cooler	August 17th, 1876
T. H. Goodwin	August 17th, 1876
Hyler Ott	September 30th, 1876
H. S. Delos	November 3d, 1876
James Holden	January 18th, 1877
Yavapai County, 6:	
Ed. H. Wells	July 17th, 1875
Murat Masterson	March 1st, 1876
A. J. Bruner	August 6th, 1877
J. E. Roberts	June 11th, 1874
James Gough	February 5th, 1876
Henry A Begalon	June 30th, 1877
Yuma County, 4:	
Peter Dohl	January 17th, 1876
H. N. Alexander	September 20th, 1876
P. M. Spinuello	May 18th, 1877
James Reilly	August 31st, 1877
Maricopa County, 3:	
William A. Hancock	September 2d, 1875
H. E. Lacy	November 5th, 1875
J. A. Parker	February 5th, 1876

Mojave County—None qualified.
Pinal County—None qualified.

Bank of Arizona.

DIRECTORS.

Joseph Brandenstein, of A. S. Rosenbaum & Co.	San Francisco
Joseph May, of Livingston & Co.	San Francisco
Samuel Lewis, of Lewis Bros.	San Francisco
Sol. Lewis	Prescott
M. W. Kales	Prescott
John J. Gosper	Prescott
T. J. Butler	Prescott

CORRESPONDENTS.

The Anglo-California Bank (Limited)	San Francisco
Messrs. J. & W. Seligman & Co.	New York

Agua Fria, Yavapai Co.

N. B. Bowers, rancher.
Fred. Hildebrand, rancher.
W. J. Herman, rancher.
John Mario, rancher.
D. Miller, cattle dealer.
Fred Plum, rancher.
John Reese, rancher.
H. Spaulding, rancher.
Fred. Williams, rancher.

Alexandra.

Anders & Rowe, general merchants.
Henry A. Bigelow, Notary Pub. and conveyancer.
James C. Reynolds, prop. Summit House.
Summit House (J.C. Reynolds, prop.)

Allen.

Berardo Freyde, merchant and hotel keeper.

Allen—*Continued.*

J. P. Heyward, general merchant.
S. G. Ladd, Justice of Peace.
John McLaws, Postmaster.
Joseph H. Richards, wagon-maker and builder.

Camp Grant, Pinal Co.

Norton & Stewart, post-traders.
Stevens & Teague, station-keepers.
M. W. Stewart, Postmaster.
T. A. Toney, attorney at law.
M. L. Wood, proprietor Hotel de Luna.

Camp Thomas, Pima Co.

Harry Campbell, hair-dresser, &c.
Clanton House (J. H. Slinkard, prop.)
Hellar & Mullett, wagon-makers and blacksmiths.
Leitch & Kehoe, cattle-dealers and butchers.
Lamb & Webber, merchant tailors.
Overton & Luten, livery and sale stable.
J. W. Powell & Co, general merchants.
F. Staples & Co, wholesale merchants.
Wm. Eagle, druggist.
Valley House (Mrs. Alice Meyer.)

Camp Verde, Yavapai Co.

C. P. Head & Co, general merchants.

Cienega, Pima Co.

W. W. Compton & Co, mining, etc.
George W. Hand, Postmaster and station agent.

Cerbat, Mojave Co.

Caldwell Wright, County Recorder and searcher of records.

Clifton, Yavapai Co.

Eusebio Castoñeda, attorney at law.
Coronado Copper Mining Co, Wm. Grant, supt.
William Grant, Postmaster.
Joy Copper M. Co, Wm. McCormick, supt.
Longfellow Copper M. Co, Wm. Smith, supt.
Longfellow House (Pablo Salcido, prop.)
Wm. Smith, mining and civil engineer.
Louis Smadbeck, M. D., physician.
Thompson Copper M. Co, E. V. Thompson, supt.

Desert Station.

(48 miles from Florence.)

Chas. H. Labaree, prop.

Ehrenberg, Yuma Co.

J. Goldwater, merchant.
R. E. Farington, freighter.

East Phœnix, Maricopa Co.

C. H. Veil, Salt River Flouring Mill.
John J. Devine, Clerk of Court, and Recorder.
Elliott House (J. C. Soss & Bro, prop.)
Morris F. Emerson, notion store.
Florence Hotel (P. S. Emprey, prop.)
M. Fearney, supt. Stonewall Jackson M. Co.
H. Goldberry & Co, general merchants.
J. Guindain & Co, general merchants
Francisco Padrias, tin shop.
Col. Chas. D. Poston, Register U. S. Land Office.
Clement Romo, general merchant.
Col. Levi Ruggles, Receiver U. S. Land Office.
Charles Summers, M. D., physician.
H. B. Summers, attorney at law.
Charles Whitlow, supt. Silver Bell M. Co.
J. D. Walker, Probate Judge.
Peter Will & Co, brewery.

Florence, Pinal Co.

Blunt, M. D., physician.
S. B. Chapin, M. D., physician and druggist.
Peter R. Boady, flouring mill.
Bushart & Co, flouring mill.
J. P. Clum, attorney at law.
Citizen, weekly paper, J. P. Clum, Editor.
M. Calisher, general merchant.
Joseph Collingwood, Postmaster.
J. Collingwood & Co, wholesale merchants.
Geo. A. Brown, agent Wells, Fargo & Co.
P. S. Empy, hotel.
E. Van Hasslacher, M. D., physician.
John W. Leonard, attorney at law.
H. B. Summers, attorney at law.
W. S. Edwards, civil engineer and surveyor.
Wm. J. Osborn, atty. at law and notary public.
Thomas McLellan, house and sign painter.
Miners' Exchange, (Jack Upton, prop.)

Florence, Pinal Co.—*Continued.*

J. DeNoon Reymert, attorney and counsellor at law.
W. H. Merritt, assayer.
Elliott House, (J. C. Loss & Bro., proprietors.)
M. Calisher, general merchandise.
Florence Wine Rooms, (Lew Bailey, prop.)
Florence Meat Market, (L. Reney, prop.)
Calhoun & Bush, livery stable.
C. F. Palmer, machinist.
City Bakery, Hy. Watzlarzick.
Samuel Bostick, barber and hairdressing.
Florence Hotel, (P. S. Empey, prop.)
Jos. Messinger, gen'l merchandise.
Florence Bakery, G. Bonerand.
Davis & Young, stoves and tinware.
J. Guindani & Co., general merchandise.

Fort Whipple, Yavapai Co.

Peter R. Brannan, post trader and general merchant.

Gila City, Yuma Co.

A. Lange, prop. station.

Globe City, Pinal Co.

Shuyrock & Hise, agents Silver City and Globe Express Line.

Greenwood, Mojave Co.

Greenwood Express, Ehrenberg to Greenwood, John Doling, prop.

Hayden's Ferry, Maricopa Co.

Chas. F. Hayden & Co, general merchants.

Hackberry, Mojave Co.

Hackberry Mill and M. Co.
L. B. Seaver, supt. Hackberry Mill and M. Co.

McCrackin Hill, Mojave Co.

Felix Simon, ranch and station.

McDowell, Maricopa Co.

John Smith, general merchant.

Mineral Park, Mojave Co.

James P. Bull, Commissioner Deeds California and Nevada.
Louis Casino, restaurant.
Alonzo E. Davis, attorney at law.
James B. Lawrence, physician.

Mohave City, Mohave Co.

Paul Breon, Postmaster.
Breon & Spear, general merchants.
Edwin Dane, blacksmith.
S. A. Freeman, physician.
Lambert & Schimps, butchers.
Mods Mine, Peter Ortiz, supt.
A. A. Spear, freighter and contractor

Montezuma Store.

(12 miles below Florence.)

Austin & Dempsey, gen'l merchandise.

Phœnix, Maricopa Co.

G. H. Anay, attorney at law.
John L. Alsop, attorney at law.
John Burger, wagon-maker.
J. M. Catten, saloon.
Julius Baneslen, baker.
Ellis Brothers, general merchants.
Wash Evans, blacksmith.
John George, saloon.
A. Goldman, general merchant.
J. J. Gardner, hotel.
W. A. Hancock, attorney at law.
Chris Heiman, bakery.
Thomas How, furniture mftr.
E. Irvine & Co, general merchants.
John Lentgerding, blacksmith.
—— Liemon, attorney at law.
Leasing & Leaskin, general merchants.
J. D. Monihan, livery stable.
H. Morgan & Co, general merchants.
Murphy & Dennis, freighters, etc.
J. E. Naylor, attorney at law.
M. L. Peralta, general merchant.
R. R. Pearson, carpenter and builder
Thomson & Thibido, druggists.
J. W. Thomson, carpenter and builder.
Henry Sayers, saloon.
M. Wormser, general merchant.
John West, blacksmith.
Charles White, hotel keeper.
K. S. Woolsey, flouring mill.
C. H. Veil, flouring mill.

Picket Post, Pinal Co.

H. DeGroat, Jr., assayer.

Prescott, Yavapai Co.

Anders & Row, general merchants.
ARAM, M'CUSKER & BRIMER, attorneys at law.
ARIZONA BREWERY, Jul. N. Rodenburg.
BANK OF ARIZONA.
L. BASHFORD & CO. wholesale general merchants.

Prescott, Yavapai Co.—*Continued.*

George T. Becker, baths and hair-dressing.
G. A. Bohlow, tobacco and cigar dealer.
E. J. BENNETT, C. E., County Surveyor, City Engineer, and Deputy U. S. Mineral Surveyor.
H. A. Bigelow, notary public and conveyancer.
Blackburn & Schulze, city brewery.
Blake & Co., assayers.
Bones & Spencer (Chas. L. Spencer and James E. Bones), dealers in tobacco, cigars, stationery, etc.
THOS. C. BRAY, general merchant.
Fred. G. Brech, wagon and blacksmith shop.
GIDEON BROOKE, prop. Plaza Feed and Sale Stable.
WILLIAM M. BUFFUM, general merchant.
Cabinet Chop House (D. C. Thorne, prop.)
California Meat Market (W. Coffee, prop.)
CALIFORNIA AND ARIZONA STAGECOMPANY, J. H. Hughes, President.
CAMPBELL & PARKER, architects and builders.
H. H. Cartter, Probate Judge, Justice of the Peace and conveyancer.
C. F. Cate, prop. Nifty saloon.
Clipper Mill (Jas. G. Wiley, prop.)
Cohen, Casey & Co., prop's O. K. feed and sale stables and yard.
Robert Connell, prop. Champion saloon.
Leon Cordier, baths and hair-dresser.
Charles Crocker, boots and shoes.
George W. Curtis, saw mill.
Dr. Warren E. Day, physician and surgeon.
DUDLEY HOUSE (Fred Williams, prop.)
T. J. DRUM, attorney at law.
Emanuel & Vallony, prop'rs restaurant and saloon.
J. L. FISHER, real estate agent, auctioneer, etc.
FITCH & CHURCHILL, attorneys and counsellors at law.
J. GOLDWATER & BRO., wholesale and retail merchants.
G. E. GOODFELLOW, physician and surgeon.

Prescott, Yavapai Co.—*Continued.*

F. L. B. Goodwin, attorney at law.
Hall & Young, house and sign painters.
J. P. Hargrave, attorney at law.
Guilford Hathaway, Gray Eagle stables.
Charles T. Hayden & Co., (Charles T. Hayden and Hezekiah Brooks) general merchandise.
C. P. HEAD & CO., wholesale merchants.
R. H. Hereford & Briggs Goodrich, attorneys.
JOHN HILL, stone cutter, contractor and builder.
JOHN HOWARD, attorney at law.
W. J. HOWARD, watchmaker and jeweler.
JAMES HOWEY, general blacksmith.
Kearney's Saloon.
Jay G. Kelley, assayer and metallurgical chemist.
Kelly & Stephens, (Wm. N. Kelly and F. A. Stephens) newsdealers and general merchants.
George D. Kindall, prop. Pioneer drug store.
Philip Kohlheyer, prop. City meat market.
J. A. Lewis, architect, builder, contractor, etc.
H. Loisilbon, merchant.
LOWELL & CROUCH, practical roofers.
J. N. McCANDLEN, physician and surgeon.
Murat Masterson, attorney at law.
S. C. Miller & Bro., forwarding merchants.
Milligan & Co. meat market.
D. F. MITCHELL, prop. Capital Art Gallery (photographic.)
Montgomery House (Whitehead & Plumridge, props.)
M. H. Mooney, merchant tailor.
Benjamin Morgan, attorney and counselor at law.
Morgan & Buck, baths, and hair-dressers.
MORGAN & DOUGHERTY, jewelry, watches and engraving.
Mount Hope Saw-mill, (Byron Sherman & Co., props.) Mount Hope, near Prescott.
A. O. Noyes, Pioneer saw-mill.
"O K" STABLE, camp house and feed yard.

Florence, Yavapai Co.—*Continued.*

T. W. Otis, general merchant and agent Singer Sewing Machine.
Pacific Brewery, (John Raibb, proprietor.)
PLAZA FEED AND SALE STABLE (Gideon Brooke, proprietor.)
Pioneer Drug Store (George D. Kendall.)
Pioneer Furniture Store (Ed. Stahl, proprietor.)
Pioneer House (Gans & Hatz, managers.)
Pioneer Saw-Mill (Caldwell & Pardee, proprietors.)
Pioneer Store, (John G. Campbell) general merchandise.
GEORGE B. PORTER & CO., furniture, etc.
John Raible, Pacific brewery.
Paul J. Robert, attorney and counselor at law.
J. M. Rodenberg, Arizona brewery.
C. F. Rogers & Co. (Prescott meat market.)
Rush & Wells, (John A. Rush and Ed. W. Wells) attorneys and counselors at law.
Sazarac Saloon.
Frank Schunemann, blacksmith and wagon-maker.
Smith & Hawley, carpenters and builders.
C. J. Spencer & J. E. Bones, tobacco and stationery.
A. J. Thibodo, M.A., M.D., physician and surgeon.
E. Thiele, M.D., physician, surgeon and accoucher.
D. C. Thom, Cabinet chop-house.
J. H. Throns & W. H. Reardon, architects and builders.
B. J. Wade, attorney at law.
GEORGE M. WATERS, millwright and contractor.
R. H. Weaver, general merchant.
Paul Weber, attorney and counselor-at-law.
W. W. Weed, official short-hand reporter.
William Wilkerson, (Clerk to Board of Supervisors Yavapai County.
Wilson & Haskell, (W. Z. Wilson and A. S. Haskell) sash, door and blind factory.
J. G. Worthington, sign and carriage painter and trimmer.
G. Urfer, lodging-house.

Skull Valley.

A. J. Whitehair, general merchant.
J. H. Dickson, station house.

Silver King, Pinal Co.

F. M. Sponagle, physician and surgeon.

Sahuarita Ranch, Pima Co.

Roddock & Brown, hotel station.

Tres Alamos.

Leonardo Apodaca, rancher.
A. Blair, rancher.
Jesus Dias, general merchant.
Thomas Dunbar, Postmaster and station-keeper.
G. Gibson, rancher.
C. M. Hooker, merchant and hotel keeper.
G. King, physician.
Frank Long, rancher.
Levi Pitts, U. S. mil. tel. operator.
A. A. Wilt, merchant.

Tubac.

J. Lillie Mercer, merchant.

Tucson.

Abadie & Co., saloon.
Juan N. Acuna, agt. Sonora & Arizona Stage Line.
John B. Allen, Mayor, merchant.
J. H. Archibald, general merchant.
J. M. Berger, jeweler.
GEORGE A. BOWEN, agt. Southern Pac. Mail Line.
Thomas Belknap, blacksmith.
C. O. Brown, saloon.
Henry Buchman, photographer.
S. W. CARPENTER, County Recorder and Notary Public.
James Carroll, livery and sale stable.
George Cooler, saloon.
Cosmopolitan Hotel, (Otto Reichenbach, prop.)
Davis & Young, hardware, stoves, etc.
Dill & Holt, "Cabinet" saloon.
C. R. Drake, Asst. Postmaster.
S. H. Drachman, general merchant.
C. T. Etchell, blacksmith.
FARLEY & POMEROY, attorneys at law.
Geo. Forster, saloon.
Thomas Gardner, lumber merchant.
J. Goldberg, American grocery.
John Goldtree, Telegraph saloon.
T. F. Griffith, livery stable.

Tucson—*Continued.*

Hereford & Goodrich, attorneys at law.
J. G. Handy, M. D., physician.
J. M. Henderson, carpenter.
J. M. Hancock, carpenter.
R. G. Huffaker, "American" restaurant.
L. C. Hughes, attorney at law.
L. M. Jacobs & Co., general merchants.
A. E. Johnston, harness maker, etc.
J. M. Jansco, M. D., physician and surgeon.
Los Dos REPUBLICAS, weekly Spanish newspaper.
James Lee, prop. "Pioneer" flour Mills.
Levin & Braun, saloon, brewery.
C. H. Lord, Postmaster and U. S. Depositary.
Lord & Williams, general merchants
Lowenstein & Co. general merchants
J. S. MANSFIELD, news depot and bookstore.
Chas. Meyer, druggist.
John Moore, meat market.
W. J. OSBORNE, attorney, notary public and conveyancer.
Dolores Oros, millinery goods.
W. C. Reed, carpenter.
Palace Hotel (C. A. Paige, prop.)
Theo. Schmidt, Star bakery.
Sonora and Arizona Stage Line, Juan N. Acuno, agent.
W. O. Sullivan, carpenter.
H. B. Summers, attorney.
L. Traner, auction and commission.
G. W. Treaner, livery and sale stable.
Tucson Soda Works (Haraszty & Baker, props.)
Tully, Ochoa & Co., general merchants.
Charles H. Tully, editor "Los Dos Republicas."
John Wasson, Surveyor General.
Theodore Welisch, general merchant.
Theo. F. White, civil engineer.
R. A. Wilbur, M. D., physician.
John Wild, carpenter.
A. Wilkins, barber.
L. & Wm. Zechendorf, general merchants.
D. Velasco, general merchants.

Walnut Grove, Yavapai Co.

Arbuckle & Co., mining, etc.
Boons & Jinkins, mining, etc.

Walnut Grove, Yavapai Co.—*Continued.*

J. M. Bennett, Postmaster and Justice of the Peace.
A. Columbia, horticulturist.
Wm. Columbia & Co., mining, etc.
S. W. Jackson, rancher.
Timothy Lamberson, rancher.
J. M. Myers, rancher.
S. & J. Condsen, stock growers.
A. Woodstock, millman.
Huffler's Quartz Mill, near Walnut Grove.

Wickenburg, Maricopa Co.

E. O. Grant, general merchant.
M. L. Peralta, general merchant.
J. H. PIERSON, sec'y Cal. and Arizona Stage Co.

Williamson Valley, Yavapai Co

Dawes & Goldman, general merchants.

Yuma, Yuma Co.

James Abegg, news depot, stationery, etc.
H. N. Alexander, attorney at law.
JAMES M. BARNEY, wholesale merchant.
Capitol Hotel and Restaurant (Wm. Smith, prop.)
John G. Capron, agent Mitchell's wagons.
Colorado Commercial and Land Co, Sam. Purdy, Jr., supt.
COLORADO HOTEL (Isaac Levy, prop.)
Miguel Contreras, saddlery and harness.
COLORADO STEAM NAVIGATION CO, J. Polhemus, Jr., supt.
H. S. Fitzgerald, Postmaster.
H. S. Fitzgerald & Co., general merchandise.
Forrest House (Mrs. M. F. Forrest, proprietress.)
Grand Hotel, (G. Blair, prop.)
John Guliana, restaurant.
C. Horner, blacksmith.
Henry Horton, saloon.
A. M. James & Co., produce and commission.
KERENS & MITCHELL, propr's SOUTHERN PACIFIC MAIL STAGE LINE.
H. E. Lindsey, attorney at law.
A. Lorette, general merchant.
J. H. McKenney, restaurant.
George Martin, druggist.

Yuma, Yuma Co.—*Continued.*

McIntosh & Patten, saddlery, etc.
Monteverde & Gaudolfo, groceries and liquors.
David Neahr, general merchant.
A. W. Pratt, watchmaker.
Samuel Purdy, Jr., attorney at law.
W. P. Painter, M.D., physician.
Hon. De F. Porter, District Judge.
Redondo & Bro., grain dealers.
James Reilly, attorney at law and District Attorney.
Julius Samter, general merchant.
E. J. Smith, furniture, etc.
L. Smith & Bros., market.
Steinman & Feick, propr's "Colorado" market.
SOUTHERN PACIFIC R. R. CO., A. J. Finlay, agent.
W. Townsend & Co., general merchants.
O. F. Townsend, surveyor.
GEORGE TYNG, Editor SENTINEL.
P. J. Walker, attorney at law.
Wells, Fargo & Co.'s Express, M. B. Van Fleet, agent.

Glossary of Mining Terms

IN

COMMON USE IN THE MINING STATES AND TERRITORIES.

[The Cornish and Spanish or Mexican terms have been selected, because they are those chiefly used. In the Nevada, Colorado, Utah, and California mines the Cornish terms have become common, owing to the large number of workmen from Cornwall who have been and are employed. In Arizona and New Mexico, as well as in southern Colorado, the Mexican terms are in common use, because Mexicans are the principal workmen.]

Cornwall Mining Terms.

A.

Acicular—Slender and straight crystals.
Adit level—A horizontal excavation through which the water drawn from the bottoms of the mine thereto by the engine, and that from above, passes off to the surface. This level is usually commenced from the bottom of the deepest neighboring vale, and extended throughout a great part of the mine.
Aggregated—Where the component parts only adhere together, and may be separated by mechanical means.
Air-machine—An apparatus for forcing fresh air into, or withdrawing foul air from, badly ventilated places.
Air-pipes—Tubes or pipes of iron or wood, for ventilating underground, or for the conveyance of fresh air into levels having but one communication with the atmosphere, and consequently no current of air.
Aitch-piece—That part of a plunger-lift in which the clacks are fixed.
Alliaceous—The garlic odor of arsenical minerals when heated or struck.
Amorphous—Without form.
Anhydrous—Without water of crystallization.
Arborescent—Ramifying like a tree.
Arch—A piece of ground left unworked near a shaft.
Arched—The roads in a mine, when built with stones or bricks, are generally arched level drifts.
Argillaceous—Consisting of clay.

Arseniate—The arsenic acid united with a base, as copper in the arseniate of copper.

Attle—Rubbish, containing little or no ore.

Average produce—The quantity of fine copper contained in 100 parts of ore; thus, a parcel of ore, having a produce of 10½, contains 10½ *per cent.* of copper, being above the average of copper ores in Cornwall.

Average standard—The price per ton of fine copper in the ore, after adding returning charges for smelting, of £3 15s. per ton of ore, in Cornwall, and £2 5s. per ton of ore at Swansea.

Axis of a crystal—The lateral planes surround its axis, which is an imaginary line passing down the middle of the prism from the center of the upper to that of the lower terminal plane.

B.

Back—The back of a lode is the part nearest the surface. The back of a level is that portion extending above it to within a small distance of the level next above.

Bal—The miners' term for a mine.

Bar of ground—A vein of different description of rock, etc., from that in its vicinity.

Base—The substance to which an acid is united.

Batch of ores—Certain quantity of ore sent to the surface by any pare of men.

Bearers—Supports to the pump in the engine shaft.

Beat away—To excavate; usually applied to hard ground.

Bed—A seam, or horizontal vein of ore.

Bend—Indurated clay; a name given by miners to any indurated argillaceous substance.

Bit—The steeled end of a borer.

Black-jack—Blende.

Black tin—Tin ore ready for smelting.

Blast—The air introduced into a furnace.

Blast holes—The holes through which the water enters the "windbore," or bottom of a pump.

Blasting—Forcing off portions of rock by means of gunpowder. A hole is made with a borer, into which gunpowder is inserted, then confined, and set fire to.

Blende—One of the ores of zinc, composed of iron, zinc, sulphur, silex and water; on being scratched it emits a phosphoric light.

Block tin—Metallic tin.

Blower—A smelter.

Bob—The engine beam.

Borer—A boring instrument, with a piece of steel at the end, called a boring bit.

Botryoidal—Globular forms such as are found in copper, etc.

Bottoms—The lowest workings either in a slope, level, or elsewhere.

Boulders—Large stones or pebbles.

Bounds—The proprietary of tin ore over a given tract.

Bonney—A distinct bed of ore that communicates with no vein of ore.

Brace—The platform placed over the mouth of a shaft, or winze, and to which the tackle is fixed.

Branch—A small vein which separates from the lode, and very generally unites again therewith.

Brood—Impurities mixed with the ore.

Bryle—The traces of the presence of a lode, found in the loose matter, on or near the surface.

Buckers—Bruisers of the ore.

Bucket—The piston of the lifting pump.

Bucket-lift—A set of iron pipes attached to a lifting-pump.

Bucket rods—Wooden rods to which the piston of a lifting-pump is attached.

Bucking iron—The iron, or tool, with which the ore is pulverised.

Bucking plate—An iron plate on which the ore is placed for being bucked.

Buddle—An apparatus by which the stamped tin is washed from its impurities: there are various contrivances in use; Brunton's Frame, the Round Buddle, and Zenner's Rotating Buddle, being the most approved.

Buddling—Separating the ores from the earthy substances, by means of an inclined hatch, or cistern.

Bunch or squat of ore—A quantity of ore of small extent; more than a "stone," and not so much as a "course."

Bunney—See *Bonney*.

Burden or overburden—The substances reposing on a bed of stream tin ore.

Burning house—The furnace in which ores are calcined to sublime the sulphur from pyrites; the latter, being decomposed, are more readily removed by washing.

Burrow—A heap of deads, attle and rubbish.

C.

Cage of a whim—The barrel on which the rope is wound up

Cal—Wolfram.

Callys—See *Killas*.

Caud or Kaud—Flour.

Capel—A stone composed of quartz, schorl and horneblende, usually occurring on one or both walls of a lode, and more frequently accompanying tin than ores.

Captain—One of the superintendents of the mine.

Captain dresser—Superintendent of the dressing of ores.

Carrack—See *Capel*.

Cast after cast—The throwing up of tin stuff, etc., from one stage of boards to another; the stages are placed about a fathom apart.

Cases of spar—Veins of quartz (not containing ores) which have not a direction parallel to the lodes.

Casing—A division of wood planks, separating a footway or a whim, or an engine shaft, from one another.

Cathead—A smaller capstan.

Caunter lode—A lode which inclines at a considerable angle with the direction of the other bodies in the vicinity.

Charger—An implement in the form of the bit of a carpenter's augur, for charging holes for blasting, which are dug horizontally.

Chats—Small heaps of ore.

Chimming—A process of similar effect to tossing, but being performed on small quantities of ore, the keeve is supported on the verge of its bottom.

Clack—The valve of a pump of any description.

Clack-door—The aperture through which the clack of a pump is fixed and removed.

Claying—Lining the hole (in which gunpowder is to be placed) with clay, to prevent the powder becoming damp.

Cob—To break the ore with hammers in such a manner as to separate the dead or worthless parts.

Cockle—Schorl.

Coffering—Securing the shaft from the influx of water by ramming in clay.

Coffin—Old workings open to the day.

Collar of a shaft—The timber by which its upper parts are kept from falling together.

Collar launder—The pipe or gutter at the top of a lift of pumps, through which the water is conveyed to the cistern.

Connection, or *connecting rods*—The larger rods which are attached to the engine beam.

Core—Miners usually work but six hours at a time, and consequently four pairs of men are required for the whole time—"forenoon core," from 6 A. M. to noon; "afternoon core," from noon to 6 P. M.; "first core by night," from 6 P. M. to midnight; and "last core by night," from midnight to 6 A. M.

Costeaning—Discovering lodes by sinking pits in their vicinity, and driving transversely in their supposed direction.
Country—The strata or rock through which the vein or lode traverses.
Course of ore—A portion of the lode containing a regular vein of ore.
Cover—The box into which the ore is removed from the rock; also the place at the head of the trunk, in which the slimes are, by agitation, mechanically suspended in water, in the process of trunking.
Creases—Divisions of buddled work.
Crib, or Curb—A circular frame of wood, screwed together, as a foundation for bucking, or pulverising ore in a shaft.
Crop—The best ore.
Cross-course—A lode, or vein, which intersects or crosses a lode at various angles, and generally throws the lode out of its regular course.
Cross-course spar—Radiated quartz.
Cross-cut—A level driven at right angles to the direction of the lode.
Crushing—Grinding the ores without water.
Cube—A solid figure contained under six equal sides.
Cuneiform—Wedge-shaped.
Cupola—A small furnace.
Cut—To intersect by driving, sinking, or rising.

D.

Dam—Choke damp, foul air.
Deads—Attle or rubbish.
Dead ground—A portion of the lode in which there is no ore.
Dean—The end of a level or cross-cut.
Dialling—Surveying for the purpose of planning.
Dilleuing or Terluing—Washing ores supported on a hair-bottomed sieve in water.
Dippa—A small pit.
Dish—That portion of the produce of a mine which is paid to the land-owner or lord.
Dissuing—Is when the lode is small and rich, to break down the strata from one of its walls, by which means it can afterwards be taken away without being deteriorated and without waste.
Dowsing rod—The hazel rod of divination, by which some pretend to discover lodes.
Draft-engine—An engine used for pumping.
Dredging-ore (also called *dradgyore* or *drady-trade*)—A stone impregnated or traversed by minute veins of ore.
Dressers—Cleaners of the ore.
Drift—The excavation made for a road underground.
Driving—Digging horizontally.
Dropper—A branch when it leaves the main lode.
Dry—A place fitted with steam pipes and other heating apparatus, wherein miners' underground garments are dried.
Durns—A frame of timber with boards placed behind it, to keep open the ground in shafts, levels, etc.
Dzhu, or Hulk—To dig away a portion of the rock, etc., on one side of the end, that the blast may be more efficient.

E.

Elvan—Porphyry, clay, stone.
End—The further extent of a level or cross-cut.
Engineer—The superintendent of the machinery.
Engine man—Man who attends to and works the engine.
Engine-shaft—The pit or shaft by which the water is drawn by the engine from the lower parts of the mine to the adit, or surface.

F.

Fang—A niche cut in the side of an adit, or shaft, to serve as an air-course; sometimes a main of wood pipes is denominated a fanging.

Farm—That part of the lord's fee which is taken for liberty to work in tin mines only that are bounded—generally one-fifteenth.
Fast—The firm rock beneath the diluvium.
Feeder—A branch when it falls into the lode.
Flang—A two-pointed pick.
Flat-rods—Rods for communicating motion from the engine horizontally.
Floran tin—Tin ore scarcely perceptible in the stone; tin ore stamped very small.—*Pryce.*
Flookan—A soft, clayey substance, which is generally found to accompany the crop courses and slides, and occasionally the lodes themselves; but when applied to a vein, means a cross-vein or course composed of clay.
Fluke—The head of the charger; an instrument used for cleansing the hole previously to blasting.
Foot-wall—Is the wall under the lode; it is sometimes also called the underlaying wall.
Foot-way—The ladders by which the workmen ascend and descend.
Force-piece—A piece of timber put in a level, shaft, etc., in a diagonal position, for keeping the ground open.
Fork—"Water in fork," water all drawn out; the bottom of the engine shaft.
Furnace—The place in which the ore is placed for the purpose of smelting or reduction.

G.

Gad—A pointed wedge of a peculiar form, having its sides of a parabolic figure.
Glist—Mica.
Good levels—Levels driven nearly horizontal.
Gossan—Oxide of iron and quartz, generally occurring in lodes at shallow depths.
Grass—The surface.
Grain tin—Crystalline tin ore; metallic tin, smelted with charcoal.
Grate—Stamps grate; a metallic plate pierced with small holes; it is attached to the stamps, and through the holes the stamped ores escape.
Griddle or *Riddle*—A sieve.
Grinder—Machinery for crushing the ores between iron cylinders or barrels.
Ground—The country; the stratum in which the lode is found.
Growan—Decomposed granite; but sometimes applied to the solid rock.
Guag—A place that has been wrought before for tin.
Gulph of ore—A very large deposit of ore in a lode.
Gunnies—Levels or workings.
Gurt—A gutter; a channel for water.

H.

Halvanner—The dresser of, or operator on, the halvans.
Halvans—The ores which are not sufficiently rich to be offered for sale until much of the impurities with which they are mixed are removed by operations in water.
Hanging wall—The wall or side over the lode.
Hauling—Drawing ore or attle out of the mines.
Head-sword—The water running through the adit.
Head tin—A preparation of tin ore towards the working it into metal.
Heave—The horizontal dislocation which occurs when one lode is intersected by another having a different direction. A right or left hand heave is when the part of the intersected lode on the opposite side of the traversing vein is found by turning either to the right or the left.
Hoggan—The tinner's pasty.
Hook-handles—The handles by which a windlass is worked.
Horse—The dead ground included between the branches of a lode, at the point of their separation.
House of water—A vugh or space, whether artificially excavated or not, filled with water.

Horse arm—The part of the horse whim to which the horses are all attached.
H piece—See *Attch piece.*
Huel—See *Wheal.*
Hutch—Cistern or box.

I.

Irestone—Hard clay slate, hornblende, hornblende slate, hornstone.

J.

Jigger—Cleaner of ores.
Jugging—Separating the ore with a griddle, or wire-bottomed sieve; the heavier substance passing through the bottom, or lower part of the sieve; the lighter substances remaining on the upper part are put by for halvans.
Junction—Applied to where veins unite.
Jumper—A long borer worked by one person.

K.

Keeve—A large vat.
Kibble—A bucket, usually made of iron, in which the ores, etc., are drawn to the surface.
Kibble filler—Man who sends up work, etc., to the surface.
Killas—Clay slate.

L.

Lander—Man who attends at mouth of shaft to receive the kibble in which ores, rubbish, etc., are brought to the surface.
Lappior—The dresser of the leavings.
Laths—The boards which are put behind and supported by the "durns."
Launders—Tubes or gutters for the conveyance of water; their form that of a long box wanting the upper side and both ends.
Lead spar—Sulphate of lead.
Leader of the lode—A branch or small vein; part of the main lode.
Learies—Empty places; old workings or vughs.
Leat—A water-course.—*Pryce.*
Leavings—The ores which are left after the "crop" is taken out.
Levels—Galleries driven on the lode, usually at ten, twenty, thirty, etc., fathoms below the surface.
Lifters—Wood beams to which the iron heads of a stamping mill are fastened.
Lock-piece—A piece of timber used in supporting the workings.
Lode—A regular vein producing or affording any kind of metal.
Lode stowan—A drang driven towards rising ground on the indications of a lode in marshy ground.
Loobs—Slime containing ore.
Lost levels—Levels which are not driven horizontally.

M.

Machine whim—A rotary steam engine employed for winding.
Mallet—An instrument used with the borer.
Material man—One who delivers out and has care of the materials.
Meat earth—The vegetable mold.
Mock lead—Blende.
More—A quantity of ore in a particular part of a lode, as a "more" of tin.
Moorstone—Granite.
Mundics—Iron pyrites.
Mun—Any fusible metal.

N.

Needle, or Nail—A long taper piece of copper or iron, with a copper point, used when stamping the hole for blasting, to make, by its withdrawal, an aperture for the insertion of the rush or train.
Nogs, or Nays—Supports for the roof of a mine.

P.

Pack—To occasion the speedy subsidence of the ore in the process of tossing or chimming, by beating the keeve in which it is performed by a hammer.
Parcel—A heap of ore dressed and ready for sale.
Pare—Gang or party of men.
Pass—A opening left for letting down stuff to the levels.
Peach—Chlorite.
Pedn cairn—A bunch of ore at a distance from the lode.
Pick—An instrument in common use, as well in agriculture as in mining.
Picker, or Poker—A hard chisel for dehuing, which is held in one hand and struck with a hammer.
Pillar—A piece of ground left to support the roof or hanging wall.
Pitch—Limits of the piece of ground set to tributers.
Pitch bag—A bag covered with pitch, into which powder is put (previously to its being introduced into a damp hole) that it may be protected from moisture.
Pitman—One employed to look after the lifts of pumps and the drainage.
Pitwork—The pumps and other apparatus of the engine shaft.
Plat—An excavation or place to contain any ore or deads.
Plunger—The piston or forcer of a forcing pump.
Plunger lift—The set of pipes attached to a forcing pump.
Point of the horse—The spot where the vein is divided into two or more branches.
Pol-rose (pronounced polrose)—The pit underneath a water-wheel.
Pot-growan—Soft decomposed granite.
Prian—Soft white clay, esteemed a favorable sign when found in a lode.
Pricker—A thin piece of iron used to make a hole for the fuse or match to fire a blast.
Prit—A solid piece of virgin metal, or the button from an assay.
Produce—Fine copper contained in 100 parts of ore.
Purser—The cashier or paymaster at the mines.

Q.

Quere (also spelled *queere* and *gooear*)—A small cavity or fissure.

R.

Rack—An inclined plane on which the ores and slime are washed and separated.
Racking—Is a process of separating small ore from the earthy particles by means of an inclined wooden frame; the impurities being washed off, and the ore remaining near the head of the rack, taken from thence, undergoes tossing.
Reed, or *Spire*—Gorse, or other tubular vegetable, into which gunpowder is put to convey a train from the snoff to the charge, the reed being put into the aperture made by the needle.
Refining—Separating the ores.
Relief—When one workman of the same pare changes core, or takes the place of another.
Riddle, or *Griddle*—A sieve.
Rising—Digging upwards.
Ros—Large stones, rough.
Rullers—The persons who work the barrows under ground.
Run—When excavations fall together.
Run of a lode—Its direction.
Rush—Used for the same purpose as the reed and spire.

S.

Scal—A shale, or portion of earth, rock, etc., which separates and falls from the main body.
Scovan lode—A lode having no gossan on its back, or near the surface.

Scraper—A piece of iron used to take out the pulverized matter which remains in the hole when bored, previously to blasting.

Seam—A horse load.

Sett—A lease, the boundaries and terms of mining ground taken by the adventurers.

Set of timber—A frame complete to support each side of the vein, level, or shaft.

Set-off—The part of a connecting-rod to which the bucket-rod is attached.

Shaft—A sinking or pit either on the lode or through the country.

Shaking—Washing the ores.

Shammel—When ore or water is lifted part of the required height by one machine or person, and part by another.

Shears—Two very high pieces of wood placed in a vertical position on each side of a shaft and united at the top, over which, by means of a pulley, passes the capstan rope. This is for the convenience of lifting out or lowering into the shaft timber or other things of great length.

Shelf—The firm rock.

Shieve—The pulley over which the whim rope passes.

Shoding—Tracing round stones from the vale to the lode whence they were torn.

Shooting—Shutting or blasting; fracturing and separating by the use of gunpowder.

Sinking—Digging downwards.

Skimpings—Skimmings of the light ores in the dressing process.

Slide—A vein of clay, which, intersecting a lode, occasions a vertical dislocation.

Slimes—Mud containing metallic ores; mud or earthy particles mixed with the ore.

Smelting—Reducing the ore by means of fire.

Snuff, or *Match*—A substance, frequently brown paper, or other slowly combustible substance, which is ignited at one end, the other being in contact with the rush or train in blasting; the slow combustion is to permit the escape of the laborers.

Sollar—A small platform at the end of a certain number of ladders.

Spalling—The breaking up into small pieces, for the sake of easily separating the ore from the rock, after which it undergoes the process of cobbing.

Span beam—The horizontal beam passing over the whim in which the upper pivot of the perpendicular axis moves.

Stamps—Machinery for crushing the ores with the presence of water.

Stamp's head—The iron weight or head connected with the stamps.

Standard—The price of fine copper.

Stem—A day's work.

Stope—A horizontal bed; ore ground adjacent to the levels; *to stope*, to excavate horizontally, layer after layer.

Spar—Quartz.

Spend—To break ground; to work away.

Squat of ore—See *Bunch*.

Strake—A launder, or box of wood without ends, in which the process of washing or tying is performed.

Strapping plates—The iron plates by which the connection rods are fastened to each other.

Stream tin—Tin ore found in the form of pebbles, most frequently in vales.

Streamers—The persons who work in search of stream tin.

String—A small vein.

Stuff—Attle or rubbish.

Stull—Timber placed in the backs of levels, and covered with boards or small poles to support rubbish.

Sturt—When a tributer takes a pitch at a high tribute, and cuts a course of ore, he sometimes gets two, three to five hundred pounds in two months; this great wages is called a sturt.

Sump—A pit; the bottom of the engine shaft.
Sump-shaft—The engine shaft.
Sump men—Men who assist the pitmen, sink the engine shaft, and attend to the machinery in the engine shaft.

T.

Tackle—Windlass, rope, and kibble.
Tamping—The material, usually soft stone, placed on the gunpowder, in order to confine its force, which could otherwise pass up the hole; also, the process of placing the material.
Tamping iron or bar—Tool used for beating down the earth substance on the charge used in blasting.
Teem—To lade water in bowls.
Throws (either up or down)—Is when a slide intersects a lode, the dislocation being shown by a transverse section. *Throws up*, is when the undiscovered portion of the intersected lode is found to have been apparently lengthened. *Throws down* is the reverse.
Ticketings—The sale of ore.
Timber man—The men employed in placing supports of timber in the interior of the mine.
Toller—A person who periodically examines the limits of ground producing the ore belonging to himself, or (the lord) his employer.
Tossing, or *Tozing*—A process consisting in suspending the ores by violent agitation in water, their subsidence being accelerated by packing; the lighter and more worthless matter remains uppermost.
Trade—Attle or rubbish.
Tram carriage—The carriage (usually made of iron) used on a tram road.
Tram-road—Iron railroad way.
Trelobbing—See *Tossing*.
Tribute—Proportion of the ore which the workman (tributer) has for his labor.
Tributers—Men whose pay is a certain portion of the ore, or value of the ore they raise.
Tribute pitches—The limited portion of a lode which is set to "a pare" of tributers, beyond which they are not, for the time being, permitted to work.
Trunk—A long narrow cistern or pit, in which the ore and slimes which are mixed are separated by the subsidence of the former, and the washing off the impurities; the inclined box in which the ore and slimy impurities are separated in the process of trunking.
Trunking—Process of extracting ores from the slimes; subsequently the ores undergo the processes of racking and tossing.
Tummals—A great quantity; a heap.
Tunnel head—The top of a furnace, at which the materials are put in.
Turning house—The first cutting on the lode after it is cut in a cross-cut.
Turned house—A term used when a level, in following branches of ore, is turned out of the original direction.
Tutwork—Work in which the laborer earns in proportion to the amount of his labor, being paid for driving at a certain price per fathom.
Tuyere—The aperture through which the air or blast is introduced into the furnace.
Tying—Washing.

Underlayer—A perpendicular shaft, sunk to cut the lode at any required depth.
Underlay-shaft—Shaft sunk on the course of the lode.

V.

Van—To wash and cleanse a small portion of ore on a shovel.
Vugh, *Vugg*, or *Vogle*—A cavity.

W.

Washing—The ore undergoes occasionally two or three washings; the first process being that of washing the slime and earthy particles from the rougher and larger stones of ore.
Water in fork—When all the water is extracted.
Well—The lower part of a furnace into which the metal falls.
Whim—A machine worked by horse, steam or water, for raising ores, etc.
Whim driver—Man who attends to the horse in the whim.
Whim rope or chain—The rope or chain by which the kibble is attached to the winding engine or whim.
Whim shaft—The shaft by which the stuff is drawn out of the mine by horse or steam whim.
Whip and derry—A kibble drawn to the surface by a horse, the rope attaching one to the other simply passing over a pulley.
Willde lead—Blende, zinc ore.
Winch or *Winze* (contraction of windlass)—The wheel and axle frequently used for drawing water, etc., in a kibble by a rope.
Windbore—The lowest pump, in which there are holes to admit water.
Winding engine—One used to draw up ore, attle, etc.
Winze—A sinking on the lode communicating one level with another, for proving the lode, or for ventilating such drivings.
Work—Ores before they are cleansed or dressed.
Working barrel—The pump in which a piston works.
Working big—Sufficiently large for a man to work in.

Z.

Zawn—A cavern.
Zighyr—When a small, slow stream of water issues through a cranny it is said to zighyr or sigger.—*Pryce.*

Spanish Mining Terms.

A.

Abra—A fissure; a considerable opening or cavity in the mountain, rock, or lode.
Abronzado—Yellow copper ore, sulphuret of copper.
Acarreadores—Wood-carriers.
Acero—Steel.
Achicar—To decrease or diminish; applied to the diminution of water in any of the workings, lowering the water in the shafts, etc.
Achicadores—Workmen employed in removing the water in botas.
Acuña—Die for coining.
Acuñacion—Coining.
Acuñador—One who coins.
Acuñar—To coin.
Ademador—A mining carpenter; a timber man.
Ademar—To timber.
Ademe—Timber work for securing and supporting the works of the mine.
Adobes—Unburnt bricks made of straw, adhesive earth, and dung dried in the sun.
Administrador—Superintendent.
Administracion—Management.
Afinacion—Refining.
Agata—Agate.
Agua fuerte—Aquafortis, nitrous or nitrous acid
Ahondar—To sink, to deepen.
Ahonde—Sinking or driving downwards.
Alabastro—Alabaster.
Albañil—Mason, bricklayer.
Albaredon—A dyke.
Albayalde—White lead.

Albergue—A natural hollow, a den.
Alcohol—Galena, sulphuret of lead, antimony.
Alcribis o Tovera—The tuyere of a smelting furnace.
Alear—To alloy metals.
Aleacion—The art of alloying metals.
Althondiga—Corn market or public granary.
Alimentos—In mining, an allowance to mine owners, as subsistence, until their mines become profitable.
Almacen—A store-house, store-room, warehouse.
Almadeneta—A stamp head.
Almagro—Ruddle, red ochre.
Almud—Twelfth part of a fanega.
Alquifal—Galena.
Alquilar—To hire.
Alta—The upper part.
Alumbre—Alum.
Ambar—Amber.
Amatista—Amethyst.
Amianto—Amianthus.
Amoldar—To mold.
Amonedar—To coin.
Amparo—The maintenance of the legal right of ownership by continued possession. In mining this can only be preserved by keeping a certain number of men at work at certain periods, as determined by the mining code.
Anchura—Width, roominess.
Angulo—An angle, a corner.
Antimonio—Antimony.
Aparejo—A table, a block and fall, an apparatus; a set of harness for beasts of burden or draft; a pack-saddle.
Apartado—Establishment for parting silver and gold.
Aperos—Utensils; also materials, such as gunpowder and paper for blasting, etc.
A pique, Trabajar a pique—Digging downwards in a vertical direction.
Apolvillados—Rich ores.
Apuradores—Men who re-wash the earth from the tinas.
Arcilla—Clay.
Arena—Sand.
Arenilla—Fine sand.
Arrastrar—Applied to where veins unite and form one; to drag.
Arrastra—Mill for grinding ores, employed in the process of amalgamation of silver ores and of gold; a crushing mill.
Arreador—Horse-driver for malacates.
Arroba—25 lbs. Spanish weight.
Arriero—A muleteer.
Arsenico—Arsenic.
Asbesto—Asbestos.
Aserrador—A sawyer.
Aserrar—To saw.
Asfalto—Asphaltum.
Astillero—Open forest, pasture for mules, etc.
Atacadero—A rammer.
Atacador—Rod for ramming in the charges for blasting.
Atajador—A boy who attends the horses and mules.
Atajo abierto—Applied to a mine when worked in the manner of a quarry, or by an open cut in a rock or mountain.
Atarjea—Water-course of masonry.
Atecas—Laborers who collect the water in buckets from the planes of the mines, in order to pass it off by the shafts; also, men who fill the skins in the shafts with water, mud, etc.

Atierras—Attle, rubbish; in the mine, earth preventing the continuation of the work.
Atizador—A stoker; man who attends the furnace.
Audiencia—Principal tribunal of justice.
Aviado—The mine-owner supplied with funds for working his mines.
Aviador—He who supplies funds for working mines.
Avio—Funds advanced for working mines.
Avios—Implements.
Ayudante—Assistant.
Azabache—Jet.
Azanca—A leat.
Azarcon—Red lead.
Azogue—Quicksilver; silver ore adapted for amalgamation.
Azogue apolvillado—Very good ore for amalgamation.
Azogue comun—Common ore for amalgamation.
Azogue ordinario—Ordinary ore for amalgamation.
Azogue razonable—Middling ore for amalgamation.
Azogue en caldo—Quicksilver.
Azogueria—The wareroom in which quicksilver is kept in store.
Azoguero—An amalgamator; person who superintends the process of amalgamation.
Azufre—Sulphur.
Azufre vivo—Native sulphur.

B.

Bancos—Rocks which intercept the vein, or cause it to take a different direction.
Banquillos—Stools on which the marquetas are placed.
Baño—The last portion of quicksilver applied to a torta.
Barquina—A large furnace.
Barquines—Forge bellows.
Barra—A bar, an iron crow; equal shares into which the interest in a mine is divided, usually twenty-four in number.
Barra de plata—A bar of silver, usually about 135 marcs, or 1080 ounces.
Barranca—A ravine.
Barrena—A drill or borer used in blasting.
Barrenadores—Miners who work with the borer and mallet.
Barrenar—To bore.
Barrenero—A boy who attends with the boring tools.
Barrenos—Holes made for blasting.
Barreta—A miner's bar or crow.
Barreteros—Miners who work with crowbars, wedges and picks.
Barro—Clay, loam, mud.
Basalto—Basalt.
Batea, or *Apuradera*—A bowl used in rewashing.
Bajo—Beneath, lower part.
Beneficiar—To extract the metal from the ore; to dress ore.
Beneficio—Making the metallic contents of the ore available by reduction.
Beneficio de cazo—Reduction of ore by amalgamation, conducted in a copper pan over a fire: a hot amalgamation.
Beneficio de hierro—Reduction of ore by amalgamation, with the addition of fragments of iron.
Beneficio de patio—Reduction of ore by amalgamation in sheds or open court-yards.
Beneficio de pella de plata—Applied when a portion of amalgam of silver is added to the mass under amalgamation.
Beneficio de la colpa—A method of amalgamation in which, instead of *magistral*, *colpa*, (colcothar) is used.
Beneficio por fuego—Reduction of ore by smelting.
Berilo—Beryl.
Bigorneta—A small anvil.

Bigornia—An anvil.
Bismut—Bismuth.
Blandura—Soft, crumbly ground.
Blenda—Blende, sulphuret of zinc.
Boca—Mouth, entrance, or pit of a mine; first opening made in the vein.
Boca mejora—A shaft or boca to communicate with the entrance of the vein to facilitate the workings.
Bochorno—Vapor, or foul air; want of ventilation; suffocating heat.
Boletas—Tickets of sales of ores; cheque tickets; account of charges, and produce of one amalgamation operation.
Bolsa—A purse; sometimes applied to a bunch of good ore of the supposed shape of a full purse or bag.
Bomba—A pump.
Bonanza—Prosperity; fine weather. A mine in *bonanza* is in a prosperous state; stopping costs; yielding profit.
Bordes—Border; ore left untouched by previous working in an old mine work.
Bordeta—A small pillar.
Borrasca—Adversity; foul weather. A mine in *borrasca* is in an unproductive state; does not stop costs.
Bota—A leather bag or sack, made of one or more skins, in which water is lifted in the mines.
Bota chica—Small leather sack.
Bota grande—Sack made of two or two and a half hides, used to extract water, and worked by horse whims.
Botilla de burro—Sack or bag, made of one neat hide, to extract water, and worked by a burro, or hand whim.
Botillo de lomo—Small sack made of one-third of a hide, to carry water out of small sinkings on men's backs.
Boveda—Vault, arch.
Braceage—Brassage in coinage.
Broculas—Drills.
Bronce—Brass, gun-metal, iron pyrites.
Buytron—Furnace for smelting ores.
Burllada—A chip taken from a mass of silver, to try whether it be standard.
Burro—A hand-whim, a windlass.
Busca—(Search.) The right to employ *buscones*, frequently claimed by the administration and persons employed in mines.
Buscones—Tributers, or miners who work on part proceeds; also, those who search for ores in a metalliferous district generally, or in a mine for such ores as have been neglected, and left behind by others.

C.

Caballerangos—Horsekeepers.
Caballitos—Men who carry the mining captains or others.
Caballo—A horse; a mass of the sterile mountain rock immersed in the lode.
Caballo de tepatate—A mass of barren rock interposed in a vein.
Cadena—A chain.
Cajon—In Peru and Chile two montons of 32 quintals each—64 quintals.
Cajon de granza—The pit to receive the crushed ore.
Cajonero—A lander, or one who receives the bota or manta at the shaft's mouth.
Cal—Lime.
Calde estaño—Calx of tin.
Calderas—Boilers.
Calenta dura—The first heating of the furnace, or putting the furnace into blast.
Calicada—Shode pit.
Caliche—Calcareous matters; ores of a calcareous character.
Calicheros—Lime burners.

Calientes—Warm ores (in amalgamation) containing sulphuret of iron and copper, and no calcareous matter.
Caliza, or *Cal en piedra*—Limestone.
Cal viva—Quicklime.
Campistas—Tributers.
Campo—A pitch, a working in possession of buscones, or allotted to the proprietors or others.
Canal—A spout, a canal.
Candellero—A socket deeper than the chumacera, and used for the same purpose.
Canilla—Used to convey the fire to the charge for blasting.
Cañon—In a mine, a level, or horizontal gallery.
Caños—Pipes, tubes.
Cantera—A quarry.
Cantero—Stone mason, quarryman; a pitcher.
Caperossa—The person in charge of the sheds under which the tahonas are worked.
Capellinas—Large iron or silver bells, under which the quicksilver is separated from the silver in the amalgam by distillation.
Capellina—The iron bell under which the silver amalgam is distilled down. See *Piña*.
Carbon—Coal, charcoal.
Carbon de leña—Charcoal.
Carbon de piedra or *Carbon de tierra*—Pit coal.
Carboneros—Carriers, makers, and sellers of charcoal.
Carcamo—The drain which carries off the earthy matter from the tinas when washing the amalgam.
Cardenillo—Verdigris.
Carena—An upright stanchion for supporting machinery.
Carga—380 lbs. Spanish; a mule load, varying in the different mining districts; a charge for blasting; a lode.
Carilleros—Ore-carriers.
Carpentero—A carpenter.
Carretilla de mano—A wheelbarrow.
Carrita—A wagon or cart.
Carritero—A wagoner.
Casa de moneda—The mint.
Cascajal—A gravel pit.
Cascajo—Gravel, rubbish.
Caso—A boiler used in hot amalgamation.
Castillo—The frame of the stamping machine.
Castina—Fluor or flux.
Cata—A mine of no great depth; a pit made in quest of the vein; a mine denounced for trial.
Catear—To search for new mines.
Caxa—Money chest, treasury.
Caxa del tiro—Reservoir at the bottom of the shaft; sump of the pit; that part of the pit below the deepest level driven from it.
Caxon—A measure of ore containing many quintals, but varying in bulk at different places; at Potosi, 5000 lbs.; a handbarrow.
Caxoneros—Landers at the mouth of a shaft.
Cebar—To feed; to supply a furnace with materials for smelting; to add quicksilver to a mass of ores under amalgamation.
Cebo—Priming, as of gunpowder; a feed, as of oats for horse; second addition of quicksilver to the torta.
Cedazos—Sieves.
Cendrada—The bottom of the refining or cupelling furnaces, made of very fine earth and vegetable ashes which have been lixiviated; materials of which a cupelling test is made; the test itself.
Cendradilla ó galeme—Cupelo.
Cerro—A mountain.

Cestas—Baskets.
Chapas—Iron blocks on which the stamps fall.
Charquedores—Cart-fillers.
Charqueo—Filling the baskets by hand.
Chihicles—Crystallised, calcareous, or other spar.
Chicuites—Baskets.
Chiflon—*Trabajar chiflon*—A phrase, meaning the work making way, both in length and depth.
Chino—Iron or copper pyrites.
Chumacerá—An iron socket for the socket of shafts.
Cielo—Roof of a work, an upward working. *Trabajar de cielo*—working at the roof or top of the vein.
Cilindro—A cylinder.
Cinabrio—Cinnabar, sulphuret of mercury.
Claro—An open space on the lode from which ore has been taken.
Clavos—Masses of native metal; bunches or masses of ore; nails.
Cobalto—Cobalt.
Cobre—Copper.
Cobre en roseta—Rose copper.
Cobrizo—An inferior kind of copper ore.
Cohete—A cartridge for blasting.
Colero—Assistant of the underground captain in charge of the peonada, or account of the daily labor.
Collado—A hill.
Colorados—Ores colored with red oxyd of iron. See *Pacos*.
Comer los pilares—To take away the pillars of the lode which had been left during the previous working of the mine to support the roof, and consequently to abandon the mine.
Comerse los pilares—The same as *Comer los pilares*—figuratively, to abandon a mine.
Comillo—A reverberatory furnace.
Compromiso—A private engagement or undertaking, also a joint-stock undertaking.
Conducta—A convoy or caravan, conveying the precious metals or coin overland.
Contra cielo—A rise, or working upwards.
Contra mina—A work of communication between two mines; also an adit.
Contra tiro—Auxiliary pit contiguous to a main pit or shaft, to serve as a footway, or for ventilation.
Convenio—A legal agreement.
Copola—A cupelling furnace.
Copos or *Pazillas*—In amalgamation, little globules into which the quicksilver forms when the process is too quick.
Coral—Copper.
Cortar pilar—To complete the pillar, and make a cross passage, and to form a landing place.
Cortar las sogas—To abandon a mine; *lit.* to cut the ropes.
Costadores—Wood-cutters.
Costal.—Sack for ore, made of the *pita* or thread of the aloe; a rammer or beetle.
Cras.—An iron cage or frame used in smelting.
Creston.—Out-cropping of a lode; the crest of a lode appearing above the surface of the ground.
Criadero—A spot which is metalliferous; a spot, a district, a mountain, a rock, where ores are supposed to grow.
Criba—Perforated leather, through which the stamped ore falls into a pit.
Crisolito—Chrysolite.
Cristal—Crystal.
Cristal de roca—Rock crystal.
Crucero—A cross cut.
Cruces—The cross pieces of the arrastras or grinding mills.

Cruzada—Applied to lodes, that which is crossed by another.
Cubo—A leather or other bucket.
Cuchara—The scraper used for extracting the pulverised ore or rock in the hole made to receive the charge for blasting; a spoon.
Cuchara de cuerno—A small horn bowl in which the earth of the tortas is washed, in order to ascertain from time to time the progress of the amalgamation.
Cuele—The art or effect of cutting or driving a mine; work in any direction; the distance or space advanced in a mining work.
Cuerda—A rope.
Cueros—Skins, generally of oxen, cows, etc.
Cuerpo—The lode; also body, as *cuerpo de la veta*, body or main vein of the lode.
Cuerpo alto—Upper branch of the lode; upper story of a house or store.
Cuerpo bajo—Lower branch of the lode; ground floor of a house or store.
Cuerpo medio—Middle branch of the lode. These three terms are used where a lode is divided into three parallel branches, with the same underlay, as at Veta Grande, Guanaxuato.
Cuña—A wedge.
Curtir—The operation of adding lime to warm ores, or magistral to cold ores, in amalgamation.

D.

Dedo—The twelfth part of a palmo; four palmos making one vara; twelve dedos=eight pulgados, or Spanish inches.
Demasia—Space unappropriated between mines or otherwise.
Denuncio—*Denunciacion*—Denouncement; a formal application to the court of mines of the district to have a mine adjudged to the applicant, the workings of which have been abandoned or inefficiently carried on during the period fixed by the ordinance, or which has never been worked at all. A person has the power of denouncing a mine which has been unworked, or inefficiently worked, or depopulated for more than four months.
Deputacion de mineria—Mining tribunal.
Derrecho—Straight, right.
Derrumbe or *Derrumbamiento*—The falling-in of the works of a mine.
Desaguador—Water-pipe or conduit.
Desagüe—Drainage.
Desagües—Outlets of every description by which the water is got rid of.
Descargue—Drawing out the last contents of the furnace; blowing out the furnace.
Descostradores—Men employed in taking down any fragment which may remain after blasting.
Descubridora (mina)—The mine in which the vein has been discovered, and which is entitled by law to a double *pertenencia*, if in a district already worked, or a triple *pertenencia*, if in a new district.
Desfrutar—To enjoy, to have the benefit of a mine.
Desmonte—Clearing away the surface of the ground; removing by the pick, blasting, or otherwise, the mountain rock, or breaking down ores.
Despachadores—Men employed in filling the *mantas* with ores, etc.
Despacho—Plat; point of junction between a shaft and a level enlarged for receiving the ores, etc., to be sent up the shaft to the surface.
Despensa—A store-room for materials and tools; sometimes, also, for the quicksilver, and even for the bullion.
Despueble—Abandoning the mine, or omitting to keep the proper number of hands at work.
Destajo—Piece or contract work; tut work.
Destajero—Tut workman, or one who undertakes to work by contract.
Diamante—Diamond.
Dique—A dike.

E.

Echadero—A plain where the mules are loaded, the metal spread out, cleaned, and weighed.
Echado—Inclination or dip of the slope.
Eje—The axis of a wheel, axis of a carriage, etc.
Embolo—A piston.
Emborrascarse—Applied to a vein which has become barren, as the spot then in work.
Emparejar—To level or square; harness cattle, saddle them.
Empleo—The quantity of quicksilver mixed with the ore on any given occasion for effecting the amalgamation.
En bonanza—Yielding profitable returns.
Encampanar una mina—To cut off the workings of a mine on the underlay by working on the lowest works from a neighboring mine.
Encapillar—To form a chamber, or an enlargement of a working, preparatory to driving another work from it.
En frutos—In produce; producing ores.
Ensalmorar—The first process in amalgamation, the act of mixing the sal-tierra with the lama.
Ensayador—Assayer.
Ensaye—Assay.
Ensayo—A trial.
Escaleras—Ladders made of poles of timber with notches cut in them, or otherwise.
Esmanil—Blende.
Esmeralda—Emerald.
Esmeril—Emery.
Espato—Spar.
Espato calizo—Calcareous Spar.
Espato fluor—Fluor Spar.
Espato pesado—Heavy spar; sulphate of lime.
Espejuelo—Mica.
Espeque—The cross level of the norea or tahona to which the mules are harnessed; a lever.
Estaca fixa—The post driven into the ground, from which the pertenencia is originally measured. *Estaca* means a stake.
Estado—A statement or account.
Estaño—Tin.
Estanique—Pond; dam of water.
Estoraque—Brown blende; sulphuretted zinc.

F.

Faenas—Work done by common laborers, such as dead work, removing rubbish, etc.
Faenero—Rubbish carrier.
Fanega—A dry measure containing 12 celamines, or 1.599 of an English bushel.
Fanegado—An extent of land; 60½ fanegados are equal to 100 English acres.
Feldspato—Feldspar.
Fierros—Stein, vulgarly Regulus, from the smelting furnace.
Flete—Freight.
Fluorspato—Fluor Spar.
Fluxo—Flux.
Fondon—A furnace for smelting ores.
Fosforo—Phosphorus.
Fosiles—Fossils.
Fragua—A forge.
Frios—In amalgamation, cold ores, those containing calcareous matter, and therefore requiring a larger quantity of sulphuric acid from the the magistral.

Frente—An end; a forehead; an extremity of an adit or other level.
Frijolillo—A breccia.
Frijoles—Frijoles, French beans, the common food of the country.
Frutos—Produce; ore.
Fuelles—Bellows.
Fundidor—A founder; a smelter.
Fundicion—Smelting; also the smelting house.

G.

Galena—Galena, sulphuret of lead.
Galera—A large shed; a mill-house, or grinding-mill; a large building, on the floor of which the treading in of the quicksilver in amalgamation takes place.
Galleria—A gallery; a level.
Gallos—Small particles of silver, which appear in the shape of spherules on the surface of certain ores after they have been strongly heated; more generally, however, applied to the spirting out of the silver from the assay button on cooling; also, fine specimens of native silver, or other rich ores.
Gamela—A large wooden bowl.
Golpeador—A miner who works with the mallet or hammer in blasting.
Granada—Garnet.
Granito—Granite.
Grano—A grain.
Granos de oro—Grains of gold.
Granza—Coarse particles of ore after grinding which require to be ground again; brayed ore.
Granzas—Poor ores.
Grasas—Slag from the smelting furnace.
Greda—Chalk.
Greña—Ores in the rough state, not cleaned.
Greta—Litharge, fullers' earth.
Guarda—A rib of different substance from the rock or lode, which, generally, is upon the sides of the vein; called in Cornwall cupels of a lode, or backs.
Guarda raya—Marks or limits of the boring, or measurement of the work done in a mine; limit or boundary line.
Gualdra—The large cross-beam in which the upper spindles of the shafts of machinery traverse.
Guia—A mark directing to the richest part of the vein.
Guijo—The iron spindle of the shaft of machinery.
Guixa—Quartz.

H.

Habilitador—He who supplies money for working a mine.
Hachas—Hatchets, axes.
Hacienda—Farm: estate; establishment for reducing ores.
Hacienda de beneficio—Establishment for reducing ores.
Hacienda de fundicion—Establishment for smelting ores.
Haciendero—The superintendent of the hacienda.
Hechado—Dip of the lode.
Herra mienta—Tools; taken figuratively, it implies a borer and hammerman.
Hierro—Iron.
Hierro colado—Cast iron.
Hierro labrado—Wrought iron.
Hilo—A small vein or thread of ore in a lode.
Hilo de la veta—Line or direction of the vein.
Hilos altos—Threads or small veins of ore falling into or proceeding from the upper or hanging wall of a lode.

Hilos bajos—Threads or small veins of ore proceeding from or falling into the lower wall of a lode.
Hoja de lata—Tin plate.
Hoja de laton—Sheet brass.
Hoja de libro—Finely laminated clay; slate; talc; *lit.* leaf of a book.
Horno—A furnace.
Horno de fundicion—A smelting furnace.
Horno de magistral—Roasting stove for copper pyrites.
Huaco—A hollow.
Hueco—A hollow place.
Huembas—Small rough beams of buildings.
Hundido—Sunk in; workings which have fallen in.

I.

Incorporar—In amalgamation, to add the first charge of quicksilver. The term *cebar* is applied to adding the subsequent charges; it also means the act of mixing in thoroughly the whole of the quicksilver with torta of wet ore.
Ingenios—Engines.
Instrumentos—Instruments, tools.
Intendente—Intendant.
Interventor—Inspector, representing the interests of the proprietors by whom appointed, or of the *aviador*.
Iridio—Iridium.

J.

Jantilla—A double-handled ladle, into which the melted silver falls from the cras.
Jaspe—Jasper.
Jornaleros—Day laborers.
Jerongo—A small basket; also a blanket.

L.

Labor—A work from which ores are extracted in general, all work of the mine, and especially the front work.
Labores de hacienda—All workings in a mine not let to tributers.
Ladrillera—An iron or stone mould, into which the melted silver is poured in order to form the barra.
Ladrillas—Bricks.
Lama—Slime or schlem from the amalgamator.
Lamero—The lama when merely thickened by admixture with saltierra.
Lameros—Lama pits.
Lancha—A sort of hard freestone.
Lapiz—Black lead.
Lapiz encarnado—Red chalk.
Laton—Brass.
Lavador—A man employed in washing the ore after amalgamation, or rather in cleansing the amalgam.
Lavaderos—Gold washings; washing vats or tubs for separating the amalgam from the slime.
Lasadores—Men who procure people to work in the mine; also, men employed to catch cattle.
Leña—Firewood.
Leñadores—The workmen employed to carry and serve the wood to the smelting furnace; also, the wood-cutters, collectors and sellers of firewood.
Lenter nillas—Large vertical wheels of the stamping apparatus.
Ley—Standard of the metals; contents in pure silver.
Ley de oro—Quantity of gold contained in the silver.
Ley de plata—Quantity of silver contained in the ore.

Libramiento—Warrant for payment for bars of gold or silver delivered at the mint, or order for funds.
Libranza—A bill of exchange.
Ligro—Flux.
Lama dura—An appearance put on by the quicksilver in certain stages of the process of amalgamation, which is noticed at the edges of the amalgam washed in the bowl for making a *tentadura*, or trial.
Limpia—Clearing out of rubbish and ruins from the old work in a mine.
Lis—A particular state of the amalgam, observed by means of the *tentaduras* or trials in the bowl.
Llano—A plain, flat ground.
Llevada—Carriage, transport.
Llevador—Carrier, conductor.
Lodo—Mud.
Losa—A flat stone.
Lumbrera—An air shaft; an adit shaft.

M.

Macero—He who has the charge and direction of crushing and grinding the ore in the tahonas previous to amalgamation.
Macizo—A solid, untouched part of the vein.
Madera—Timber.
Maestro herrero—Master blacksmith.
Maestro carpentero—Master carpenter.
Magistral—Copper pyrites used in amalgamation.
Magistral—Roasted copper ore for mixing in the amalgam heap.
Malacate—A horse whim.
Malacatero—A whim driver.
Maiz—Indian corn, the principal food used at the mines.
Malacate doble, or *Malacate sencillo*—The former whim has bags made of two ox-hides holding 1,250 lbs water; the latter, one hide, and holding half the quantity.
Manantial—A spring of water.
Mandadero—Errand boy.
Mandon—Master miner, or overseer.
Manganesa—Manganese.
Manta—A blanket, or horse cloth, used to contain ores or tools to be brought up by the malacates, now replaced generally by sacks made of the fibers of the agave, or ox-hides.
Mantear—To raise ore from the shafts in bags or mantas.
Manto—A bed or circumscribed stratum.
Maquila—Rate paid to the proprietor of a mill, or reduction work, for reducing ore on another party's account; applied chiefly to reduction by amalgamation.
Maquilero—One who dresses ores for hire.
Maquina—A machine.
Maquinas de vapor—Steam engines.
Marco—8 oz., or lb. Spanish, equal to 3,552 grains English.
Marco de oro—8 ounces of gold.
Marco de plata—8 ounces of silver. The marco de oro or marco de plata may be standard, or otherwise.
Marmol—Marble.
Maroma—A rope to pull or draw by, as a hawser.
Marquesitas—Mundic; iron pyrites.
Martillo—A hammer.
Martriquilla—A register for miners, etc.
Maza—Stamp head for pounding the ores.
Mecha—A match or fuse.
Medida—A measure.
Mejora—Improvement.

Mejora de boca—A term used when an improvement or alteration is made in the entrance to a mine.
Memoria—Weekly account of disbursements and mine expenses.
Mercurio—Quicksilver.
Merma—Loss of quicksilver in amalgamation, or of lead in smelting.
Meson—An inn mostly appropriated to muleteers.
Metal—Metal, ore.
Metal de ayuda—Metal or ores added in smelting, to assist in the reduction of the silver ores, lead, or galena, for example.
Metal pepena—Selected and picked gold and silver ores.
Metales communes—Common ores.
Metales de fundicion—Ores for smelting.
Metales plomosas—Ores impregnated with lead.
Metales porosos—Porous ores.
Metapiles—Grindstones used in the tahonas; also, pigs of copper used in hot amalgamation.
Mineral—Ore; mineral; recently applied to a mining district, formerly and still called Real de Minas.
Mineria, deputacion de—A tribunal cognizant of mining matters, elected in most cases by the mine-owners of the district.
Minero—A miner; an underground agent.
Minio—Red lead.
Modelos—Models.
Mojon—A land-mark used to mark the limits of pertenencias.
Molibdena—Molybdena.
Molienda—The act of grinding or pounding the ores; sometimes used to designate the ores ground. "*La Molienda.*"
Molinete—Shaft of tina.
Molino or *Mortero*—Stamping mill.
Molongues—Crystallization of silver ores very rich.
Montaña—A mountain.
Monteros—Stampers.
Montes—Woods.
Monton—A heap of ore; a batch under the process of amalgamation, varying in different mining districts. At Cotorce, 36 quintals; at Guanaxuato, 35 quintals; at Real del Monte, Pachuca, Sultepec and Tasca, 30 quintals; Zacatecas and Somburete, 20; Presnillo, 18; Bolanos, 15; and at Valenciana, 32.
Monton—Small heaps of ore mud, for amalgamation.
Mozo—A man-servant.
Muestras—Samples.
Mufla—A tuyere.

N.

Natas o Escorias—Slags.
Natron—Native carbonate of soda.
Negociacion—Business undertaking, as a mine, or set of mines, etc.
Nicolo—Nickel.
Nitro—Nitre.
Nivel—Level.
Nivels de agua—Water levels.
Noria—An endless chain, with buckets attached, revolving round a wheel; it is used underground for drawing water out of the pozos or sinks, which are carried down to a greater depth than the principal shaft; also, a common superficial machine for raising water.

O.

Obras—Workings.
Ocre—Ochre.
Ocre rojo, or ocre colorado—Red ochre.
Oficial de carpentero—Journeyman carpenter.
Oficial de albañil—Journeyman bricklayer.

Ojo—Bunch or small spot of ore in a lode.
Ojo de galvillo—Spots of rich ore.
Ojo de vibora—Black sulphuret of zinc.
Onique—Onyx.
Opalo—Opal.
Operarios—Workmen.
Ordenanzas de mineria—Code of mining laws.
Oro—Gold.
Oro de copela—Fine gold.
Oro empolvedo—Gold dust.
Orpimente, or *Oripomonte*—Orpiment.

P.

Pacos—Earthy ores, consisting of oxyd of iron mixed with various ores of silver; when of a red color, they are frequently called *colorados*; they are generally found near the surface.
Paja—Straw.
Pala—A wooden shovel.
Paladion—Palladium.
Palanca—A lever; a pole on which a weight is supported by two men.
Palanza de hierro—Crowbar.
Palmo—Quarter of a vara, or Spanish yard.
Pannio—The ground or country through which the lode runs; also, the matrix.
Panizo—Hornstone.
Parado—A relief or change of men, mules, or horses.
Parcinera—A partner in the mines.
Parihuela—A letter.
Partido—Division of ores between the owners and buscones.
Pasta—Uncoined silver.
Patio—A yard, court; floor of a court on which the ores pass through the process of amalgamation.
Patio—Amalgamation floor.
Pegador—Man who sets fire to the matches for blasting.
Pella—The silver mixed with quicksilver, when all the latter metal has been forcibly pressed out, except the portion which can only be separated by distillation.
Peltre—Pewter.
Peones—Native laborers or assistants; day laborers.
Pepena—Picked ore of the best quality; rich ore.
Pepenado—Cleaned ore.
Pepenadores—Cobbers, cleaners, and classers of the ores.
Pepitas—Small grains of native silver or gold.
Peritos—Intelligent or practical persons selected as arbitrators to decide scientific or practical questions or disputes, or to determine the underlay of veins prior to fixing the limits of the *pertenencias*.
Perla magarita—Pearl.
Pertenencia—Extent of 200 varas upon the course of a lode to which a title is acquired by denunciation; the breadth varies, according to the underlay of the vein, from 112½ varas to 200 varas.
Peso—A dollar; any weight.
Petlanques—Crystallization of silver ores; also, silver ores which are very conspicuous in the matrix; for example, *petlanque colorado* is the red antimonial silver, whether crystallized or otherwise.
Pez—Pitch.
Pico—A miner's pick.
Piedra—Stone.
Piedra de toque—Touchstone.
Piedra cornea—Hornstone.
Piedra iman—Loadstone.
Piedra podrida—Rotten stone.

Piedra pomez—Pumice stone.

Piedras de mano—Good pieces of ore, sometimes carried up by hand, and often assigned to pious purposes.

Piedras preciosas—Precious stones.

Pilares, or *pilarejas*—The pillars of a mine.

Pileta—A trough; the hollow basin before the smelting furnace into which the metal flows; tank or small reservoir underground to collect the water of infiltration.

Piña—The cake of silver left after the quicksilver has been distilled off.

Piña—Piles of amalgam for distilling down the mercury.

Pinta—The appearance, whether favorable or unfavorable, of a fragment detached from the lode; the mark of particular metals, by which their value is recognized according to their appearance to the eye.

Pintar—To exhibit pintas, or indications of ores.

Pirites—Sulphuret of iron.

Piso—The bottom or floor of a work.

Pison—A rammer.

Pita—Thread made of the fiber of the agave or maguey.

Pizarra—Slate.

Plan—A bottom working, or working driven from the bottom of a level, adit, etc.

Plancha—Pigs, as *plancha de plomo*, pigs of lead.

Plata—Silver.

Plata de ley—Standard silver.

Plata piña—Silver after distilling off the mercury.

Plata piña—The porous silver cakes left after distilling down the mercury.

Plata parda azula y verde—Muriate of silver of different colors.

Platina—Platinum.

Pleito—A law suit.

Plomo—Lead.

Plomosos—Applied to ores containing lead.

Poblar—To set on workmen in any mine.

Polvillones—Rich ores.

Polvillos—Applied to ores, tender, rich.

Polvillos buenos—Good ores of the kind.

Polvo—Dust.

Polvoro—Gunpowder.

Polvorilla—Black silver; disseminated sulphuret of silver.

Porfido—Porphyry.

Potasa—Potash.

Pozo—A sink on the inclination of the vein; a pit; a well.

Presa—A dam.

Protocolo—Minutes.

Pueble—Actual labor performed in a mine, with the number of workmen at least prescribed by the mining laws.

Puertas—Very strong rock, which conceals the vein, and which requires blasting ere the vein is discovered; also, doors.

Pulgada—An inch.

Q.

Quadrado—A square.

Quajado—Dull lead ore.

Quarzo—Quartz.

Quebrada—A ravine.

Quebradores—Cobbers or breakers of the ore; men who break up the ores on the surface.

Quemadero—Burning house or place.

Quemazon—The barren, scorched appearance of the crest of a metalliferous lode protruding from the surface of the mountain.

Quilate—Synonymous with carat; for example, gold of 22 quilates contains 22-24 parts of pure gold, just as the English standard gold of 22-24 parts of pure gold. The quilate is divided into four granos Spanish.

Quintal—4 arrobas, or 100 lbs. Spanish, equal to 101 43-100 lbs. English.
Quita pepena—A man who stands at the mouth of a shaft, to see that none of the metal is stolen.

R.

Ramo—A branch from the main vein.
Rancho—A detached farm-house and ground; the house is often nothing more than a mere hut.
Raya—Weekly account of the expenses.
Rayador—Clerk who keeps account of the workmen's time, the stores received, etc.
Real—⅛ of a dollar; a mining district.
Real de minas—The term generally applied to a mining district, although mineral de minas is also now used.
Reata—A rope about as thick as a finger, or larger, used as lashings to *cargas.*
Reatilla—A single-twisted smaller rope.
Rebaje—A working down of high ground.
Reboltura—A mixture of the ground ore with the usual reagents or fluxes.
Rebosadero—Crest of a vein.
Recina—Rosin.
Recuesto—Inclination of a vein.
Regador—One who has a right to a certain share of water for irrigation.
Registrar—To get an entry made by the proper officer of a party taking possession of a new mine.
Registro—An entry, as above described.
Reliz—The wall of the vein.
Remolino—Mass or bunch of ore.
Rendvise—In amalgamation, said of a torta when the amalgamation is complete.
Repasar—The mixing together of the ore, quicksilver, and other ingredients in the wet state, in order to extract the metal; to work the quicksilver into the tortas of ore under amalgamation, done by treading them with mules or men.
Repasador—Laborer who treads the quicksilver into the ores under amalgamation.
Rescatador—Ore purchaser.
Rescate—Public sale of ore.
Retortas—Retorts.
Rio—A river.
Riscos—Crystals.
Rosicler—Ruby silver; red antimonial ore.
Rubí—Ruby.
Ruedas—Wheels.
Rumbo—Point of the magnetic compass.
Rumbo de la veta—Line or direction of the vein.

S.

Saca—The ore obtained from a mine in a given space of time.
Sacabocados—Punches.
Sacabuches—Hand-pumps.
Sal—Salt.
Sala—The principal room of a hacienda, or any other building.
Salitre—Saltpetre.
Sal mineral—Mineral salt for amalgamation.
Sal tierra—Impure or earthy salt.
Sal tierra—Salt earth, (containing 12 or 13 per cent. salt) for mixing in the amalgamation heap. See *Torta.*
Salineros—Applied to ores requiring much salt in amalgamation.
Salones—Saloons, large halls, hollows, or cavities in a lode.
Sangria—Letting off water by piercing the substance which dammed it in.

Sanguinaria—Blood-stone.
Sebe—Tallow or suet used for machinery, etc.
Serape—Blanket, the usual dress of miners.
Sierras—Saws ; chains of mountains.
Silla—A saddle ; a leather which passes over men's shoulders to protect them in carrying the ore.
Sitio de labor—Land measure, 5,000 varas in diameter.
Sobrante—Surplus, profit, residue.
Socabon—An adit or water level driven from the earth's surface, either on, the course of a lode, or to intersect it.
Soga—The rope to which the bota is attached.
Soquilla—The rope for the botillas de burro, botas chicas, or mantas.
Solda dura—Solda.
Soliman—Corrosive sublimate.
Sombra—Shade ; gray tinge of certain ores or matrices of ores.
Soplete—A blow-pipe.
Soto minero—Sub-miner.
Sucino—Amber.

T.

Tablas—Planks.
Tahona—A mill of small horizontal stones.
Tajadera—Wedge to break the tinas.
Tajamanil—Shingle for roofing.
Tajo—A cut.
Tajo abierto—An open cut.
Talco—Talc.
Talegra—Bags of dollars, containing 1,000.
Tanda—Task; compulsory labor; days appointed for working the mine; duration of the period in which a regador is entitled to use running water for irrigation.
Tanque—Tank, or artificial pond.
Tantalio—Tantalum.
Tapa ojos—Bandage for the eyes; used to cover the eyes of mules when treading the ore in the patio, or elsewhere.
Tarea—A task; also a certain quantity of wood for fuel; the quantity cut upon one task.
Tejo—Cake of metal.
Tellurio—Tellurium.
Tenates—Sacks made of pita, or hide, for raising the ore on men's shoulders; large leather, or coarse linen bags, in which the tenateros remove the ores and rubbish.
Tenatero—Ore-carrier from the workings to the surface, or to the despacho only.
Tentadura—An assay, or trial.
Tepetate—Rubbish remaining after cleaning the ores; also applied to all the earth of the mine which contains no metal; barren rock through which the ore runs.
Terquisite—Native carbonate of soda.
Terreros—Heaps of attle and rubbish from the mine.
Tersoreria—Treasury.
Testera—A dyke interrupting the course of a lode.
Texcar bienen horno—When the litharge is thrown out from the furnace.
Tienda de raya—A shop at which the miners obtain weekly credit.
Tierra pesada—Barytes.
Tierras—Earths; applied to ores, earthy, poor.
Tierras apolvillados—Ores a degree inferior to azogues apolvillados.
Tierras communes—Common earthy ores.
Tierras de mortero—Poor stamped ores.
Tina—A vat, or jar.

Tiro—A shaft.
Tiro de mulas—A set of mules.
Tiro general—The principal shaft.
Titanio—Titanium.
Tornero—A wooden vat.
Torta—A certain quantity of ore made under amalgamation, forming one heap, which, being of a flat shape, is called a torta, or cake.
Torta—The great flat heap of silver ore for amalgamation.
Torta rendida—Amalgam ready to undergo the washing operation.
Trapiche—Grinding mill.
Trementina—Turpentine.
Triangulos—The cogs of the stamps.
Tribunal de mineria—Mining tribunal.
Trompeto—A small malacate.
Tungstena—Tungsten.
Turba—Turf, peat.
Turbit mineral—Yellow oxyd, a sulphuret of mercury.

U.

Uranio—Uranium.

V.

Vapor—Steam; foul air in a mine.
Vara—A Spanish yard, equal to 33 inches English, nearly—109 30-100 varas equaling 100 English yards.
Velador—A watchman who takes care of the mine day and night; an under miner.
Velas—Candles.
Vena, or Veta—A vein, or lode; it is called *manta* (a cloak) when it is a bed; *clavada* (upright) when it is vertical, or nearly so; *echada* (inclined) when it has a certain dip, or inclination; *obliqua* (oblique) when it goes in that direction through the mountain; *serpenteada*, when in a serpentine direction; *socia* (companion) when it is joined by another; *rama* (branch) when it proceeds from the main vein.
Verde tierra—Verditer.
Vermellon—Vermillion.
Veta madre—The mother, or principal vein.
Vidrio—Glass.
Vigas—Beams, split or sawed timber.
Vitriolo—Vitriol.
Vitriolo azul—Blue vitriol.
Vitriolo blanco—White vitriol.
Vitriolo verde—Green vitriol, or copperas.
Voladiras—Grinding stones at the arrastras.
Vuelta—The glow of the silver, in cupellation, when the last film of oxyd of lead suddenly separates and disappears.

X.

Xabon—Soap; a peculiar description of ores.
Xabones buenos—Good ores of the above description.
Xacal—A hut in which ores and tools are kept.

Y.

Yesca—Tinder, or touchwood.
Yeso—Sulphuret of lime.
Yunque—Anvil.

Z.

Zacate—Maize, straw, or grass, given to the mules.
Zanca—A ditch.
Zurron—A sack made of leather; cochineal is packed in zurrones.

Description of Rickard's Patent Oxydizing and Chloridizing Furnace, for Roasting Copper, Silver, and other Ores, prior to Leaching or Amalgamation.

The subject of roasting ores, more particularly for chloridizing silver ores, is one that has engrossed the attention of miners and mill-men on the Pacific Coast for many years, in consequence of the impossibility of profitably extracting the precious metals from the majority of the minerals in which they are met with, without having recourse to this preliminary operation. Prior to the discovery of the Comstock Lode, the reverberatory furnace was the only one which was to be relied on in order to insure good and safe results; but it was soon found that its action was too slow and costly in labor and fuel to meet the requirements of the districts in which it was most needed, in consequence of the high rates of wages and of wood. A demand for automatic furnaces necessarily arose, and was promptly responded to by a number of inventions and novel adaptations, each of which claimed to have overcome all the objections to the old reverberatory; but, alas! like the innumerable substitutes which from time to time had been brought forward to replace the old Cornish stamps, they, one and all, failed to accomplish what they undertook to do—none of them chloridizing the silver more effectually than had been previously done by the old system, while many were utter failures, being defective in both chemical and mechanical principles. Others again were so costly to construct, or so burdened with excessive and unreasonable royalties, that even if they had performed all they professed to accomplish, (which they did not) their use would have been a questionable benefit; while a great number were so overloaded with heavy, cumbersome iron work and machinery as to suggest the idea of their having been introduced for the sole benefit of the foundry-man and teamster, their transit to some of our remote districts involving an outlay far exceeding the already heavy cost at the foundry.

The principle of roasting ores being simply one of introducing oxygen to the heated mineral in the most rapid and effectual manner, the patentee of this furnace, while engaged last year in Servia in operating very low grade (two and a half per cent.) copper ores by the Hunt & Douglas system of reduction, after trying some of the most approved Californian furnaces with a view of accomplishing the roasting at a figure which would leave a margin of profit, but without attaining it, designed this furnace on the basis of the old reverberatory, with the introduction of oxygen in such quantities and under such circumstances as accomplished all that was required—the ore passing through at the rate of twenty tons per day, thoroughly roasted, while the amount of labor and fuel required was reduced to a minimum which left a handsome profit on the process—having accomplished this very satisfactory result with TWO AND A HALF PER CENT. COPPER ORES, as will be seen from the following testimonial:

MAIDANPEK, SERVIA, July 10th, 1876.

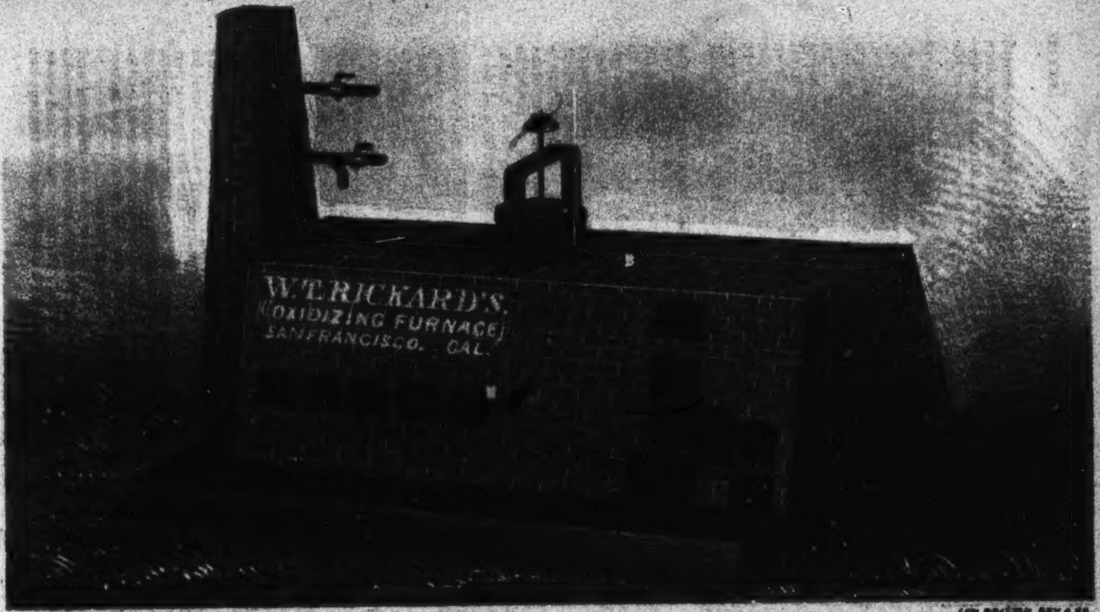
W. T. RICKARD, ESQ.,

Dear Sir:—I am directed by the Board of the Servian Copper and Iron Company to convey their thanks to you for your skill and energy in bringing into successful operation a process for the reduction of the ores of Maidanpek.

I remain, dear sir, yours sincerely,
BRENTON SYMONS, Resident Director.

Mr. Rickard now offers it to the notice of the miners and mill men of the Pacific Coast, with every confidence that it will be found to meet a requirement which has long been most urgently felt, equally by the wealthy corporation and the needy miner, as, he flatters himself, will readily be seen by the following description and illustration.

It is constructed on a simple and inexpensive plan, which retains all the well-known advantages of the old reverberatory, combined with some novel applications of chemical and mechanical forces, which expedite its oxydizing, sulphating or chloridizing action without entailing any additional expensive machinery or special technical skill in the management.


W. T. RICKARD'S
(OXIDIZING FURNACE)
SAN FRANCISCO. CAL.

LITH. BRITTON, REY & CO.

W. T. RICKARD'S OXIDIZING FURNACE — *EXTERIOR*.

It consists of an ordinary three-hearth reverberatory furnace, fitted with the usual fire-place, discharging holes in floors and working doors; iron pipes or brick flues are carried round the lower hearth, through the fire-bridge, and terminate in a horizontal orifice, in the throat or gorge of the furnace.

Through these pipes or flues a powerful blast of air is sent by means of a fan, or other blower, which, being raised to a red heat during its passage, strikes with considerable mechanical force a shower of pulverized ore, which enters the furnace from another horizontally-elongated orifice, placed two inches above this hot air blast; the supply of ore being regulated by a screw, with a conical pulley, working in a hopper, which conveys it into the vertical passage terminating in an elongated ejection. The screw is worked faster or slower according to the character of the ore being operated on, or, in other words, the quantity of sulphur, arsenic or metal which has to be oxydized or burnt off. For instance, ores containing from 15 to 20 per cent. of sulphides or arsenical metal, may be introduced at the rate of a ton an hour into a medium sized furnace of say ten by five feet hearths, while those carrying higher percentages of pyritous or other oxydizable matters must be fed more slowly, till the maximum quantity shall have been determined by the operator.

The mechanical effect of the hot-air blast is to scatter the ore all over the three hearths of the furnace, previously brought to a bright red heat, but not beyond, by the ordinary firing; the heavier (larger) particles falling on the bottom, while the lighter (finer) portion is carried by the blast on to the two upper floors, and finally into the extensive dust chambers attached, where the continuous force of the blast keeps it in motion, scattering it through the atmosphere, and exposing fresh surfaces on the floors much more effectually than can be accomplished by any raking motion, either by hand or by any system of machinery, both of which involve a serious outlay, fatal in low-grade ores, while this arrangement performs the mechanical work at no cost beyond the insignificant item of power to keep the blower in motion. The coarse ore, falling on the bottom hearth, is acted on by special hot-air jets, proceeding from the fire-bridge and sides of the furnace.

Its chemical effect is produced by the introduction of the largest possible amount of oxygen, in the form of atmospheric air, of a high temperature, which will not cool the furnace, uncontaminated by the products of combustion, as is the case with roasting furnaces hitherto in use. The oxygen is, consequently in the best possible condition for combining with the sulphur and other matters in the ore to be oxydized, which, being by the force of the blast simultaneously spread, in a finely divided state, over a large and ever-changing heated surface, is almost instantaneously attacked by the oxygen, and either thrown off as a gaseous product of combustion, (SO_2, etc.) or retained in the furnace as a metallic oxide.

When it is considered that a ton of pyritous ore requires about its own weight of oxygen to roast or oxydise it completely, by converting the sulphur into sulphurous acid gas, and the iron into a state of peroxide; and, that a cubic foot of air contains but a quarter of an ounce of oxygen, it will readily be seen why the action of the old reverberatory furnace has been so slow and costly; incessant labor having been necessary to rake over the ore, in order to present fresh supplies of oxygen which found its way into the furnace through the fire bars and fuel. The air having performed its duty as a supporter of combustion on the carbon and hydrogen of the fuel, had very little oxygen left available for the purpose of desulphurizing and oxydizing the ores. Hence, its abandonment in the Pacific States, where the cost of labor and fuel would only admit of its use in cases where the richest kind of ores were being reduced.

The numerous improvements which have been made in roasting and chloridizing furnaces, within the last few years, present some very ingenious and effective mechanical arrangements for scattering the pulverized ore in the flame, and doing away with the expensive hand labor of raking; but most of them involve a heavy cost in current working charges, in addition to the wear and tear of the indispensable machinery, and also fail in the essential point of furnishing the necessary oxygen in such quantities and under such circumstances as to produce almost instantaneous oxydation;—*i. e.* perfect roasting—either by chloridizing, sulphating, or other condition desired for the further treatment of the ore through the instrumentality of the all-important element, oxygen.

Another very valuable and economic effect produced by this introduction of large volumes of hot air is the complete combustion of all the fuel used, not a particle of which can escape in an unconsumed condition as soot; the result being a maximum roasting effect with a minimum supply of fuel.

By the time the hot air has passed through all the dust chambers and reached the chimney, it has become charged, more or less, with fumes of sulphurous and sulphuric acids, which, being brought into contact with steam, air and water, (aided by nitrous fumes evolved from the dust chamber) which are introduced by suitable pipes and taps into the tower, are converted wholly into sulphuric acid, (as in an ordinary vitriol chamber) which is collected in a lead vessel at the bottom of the shaft, furnished with an overflow pipe which communicates with another larger vessel of the same kind, sunk in the ground in any convenient part of the premises, from whence the acid may be pumped up from time to time, and used for washing tailings, where copper ore has been operated on by the "Hunt & Douglas" or other lixiviating process, blue-stone making, or for other purposes.

By a careful attention to the requisite temperature and other essential conditions, copper ores may be sulphated to a higher percentage in this furnace than has hitherto been attained by any other system of roasting.

When used for chloridizing silver ores, the highest practical results are obtained with from one-third to one-half less salt than is now being consumed by the very wasteful and unnecessary custom of introducing it into the furnace with the raw ore, by which the greater portion of it is converted into sulphates of soda, lime, alumina, and other useless and valueless products, before its chlorine commences to act on the silver contained in the ore. By simply mixing the actual quantity of salt necessary to accomplish the chlorinization of the silver in the roasted ore on the bottom hearth of the furnace, (after adding the ore from the two upper hearths for the purpose) for about a quarter of an hour before withdrawing the charge, a most perfect chloridizing effect will be produced, enabling the ore to be worked up to 90 or 95 per cent. of its assay value.

In addition to the advantages already stated regarding its power for rapid and cheap oxydation, chloridation, etc., it can be worked at a very small expense, only two men, (viz.: one to feed, with another to fire and discharge) being required on a shift, or four to the day of twenty-four hours, during which time, while roasting twenty tons of ore, its consumption of wood will not exceed three cords, (usually not over two and a half) in consequence of a suitable moderate temperature being steadily maintained, (overheating being carefully avoided) and the complete combustion obtained by the introduction of heated air, thereby avoiding the customary loss of fuel, (30 to 50 per cent.) entailed through the habitual and almost universal neglect in providing a proper combustion chamber in roasting and other furnaces.

The pulverized ore, after desulphurization in this furnace, is ready for further treatment by leaching or amalgamation, or both combined; and as most of the auriferous and argentiferous ores of Arizona are of such a refractory character as to make roasting an imperative necessity before the precious metals can be extracted, either by amalgamation or leaching, a cheap, easily-constructed furnace of this kind, that can be erected chiefly with clay and bricks, obtainable in the immediate neighborhood of the mines, is of paramount importance in a financial point of view, when it is remembered that freight of material from San Francisco ranges from six to ten cents per pound, according to the locality where it may have to be delivered.

W. T. RICKARD'S OXIDIZING FURNACE — INTERIOR.

When the gold and silver are associated with copper in the ore, as is frequently if not generally the case in Arizona, a special process is recommended by Prof. Rickard, by which the whole of these metals may be economically extracted within a small percentage of their assay value, and which is conducted in the following manner: The roasted ore, either in a chloridized or oxydized state, as may be considered most desirable, is introduced into wooden vessels with the liquor used in the Hunt & Douglas process for extracting copper, and agitated some time in order to take the base metals into solution; when mercury is introduced, and the agitation continued with the application of steam heat some six or eight hours, by which time the precious metals become thoroughly amalgamated with the mercury; the contents are then transferred to a wooden settler, (all contact with iron being carefully avoided) from whence the mercury is drawn off, and the bullion obtained in the usual manner. The contents of the settler are then run on to a wooden filter, which separates the liquor, holding the copper in solution, which is received in another wooden vessel containing scrap iron, on which the copper is precipitated in an unusually pure condition of from 95 to 99 per cent. This is removed from time to time and smelted in a refining furnace at one operation into B. S. (best selected) copper, which commands the highest price in the market.

Or, in some cases, when the copper largely predominates, it may be extracted by the Hunt & Douglas process, and the precious metals afterwards obtained by amalgamation or leaching, either with brine or hyposulphite of lime or soda, as may be considered most desirable.

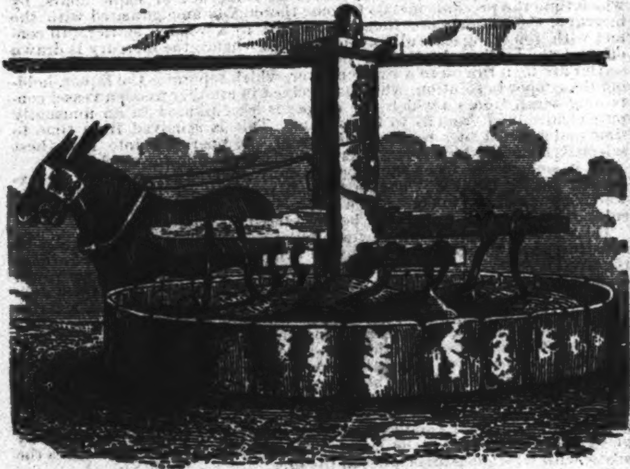
The wooden vessels in which the process is conducted may generally be constructed on the spot, and are to be arranged as follows: The furnace (figure 1) is erected on the highest level, from whence the ore is conveyed on a tram car to the lixiviating and amalgamating vessel (2) immediately below it, which discharges into the settler (3), on the next level, beneath which is the filter (4), which discharges the liquor into the precipitating vessel (5) underneath, while the tailings are thrown into the washing settler (6) on the same level, for the purpose of recovering any mercury which may have escaped from the settler. A pump brings up the liquor from the precipitating vessel to the store vat (7), whence it is drawn by suitable pipes back to the lixiviating vessel, to operate on fresh batches of roasted ore, the metallic iron used in precipitating the copper being restored it to its normal condition of protochloride of iron, which, aided by an excess of brine, takes the copper into solution, while it chloridises the silver with which it is associated in the ore.

The advantages obtained by the applications of these modern chemical, or hydro-metallurgical modes of operating are conspicuously demonstrated when compared with the old system of reduction practiced by the Spaniards, and still in use by the modern Mexicans. Instead of the rude arastra and patio, grinding a few quintals of ore a day, and requiring from one to three months to accomplish an imperfect amalgamation, wasting from one-half to one-third of the argentiferous contents of the ore, and an immense percentage of the mercury employed, we have now at our disposal an extremely simple process, by which the copper and precious metals are obtained from the crude ore in the course of a few days, (say from three to five) within a trifling percentage of their assay value, losing very little mercury, when employed, and in some cases entirely dispensing with its use, and operating on any scale of magnitude that may be desired, from twenty to a thousand tons per day, and that at so small a cost as to admit of working a grade of ore so low as would have been deemed incredible twenty years ago—copper ore as low as two per cent. having been worked to a good profit by this system of reduction, while the gold and silver is extracted so close as to render any further treatment of the tailings unnecessary and unprofitable.

The old method of working was conducted as follows:

The Patio process of amalgamation can only be successful in a certain class of ores. They are crushed and ground to fine powder in an arastra, and, without roasting, mixed with salt, and piled up on a floor in equal piles. Quicksilver is added, and then the whole mass is kneaded like dough by driving mules through it. Lime or magistral is added in certain quantities. The process varies in length according to the weather—in summer taking from two to three weeks; in the cold season much longer. The whole mass is worked, and the resulting amalgam retorted to fine silver.

The process of grinding by the slow and tedious arastra is shown in the accompanying illustration.



MEXICAN ARASTRA.

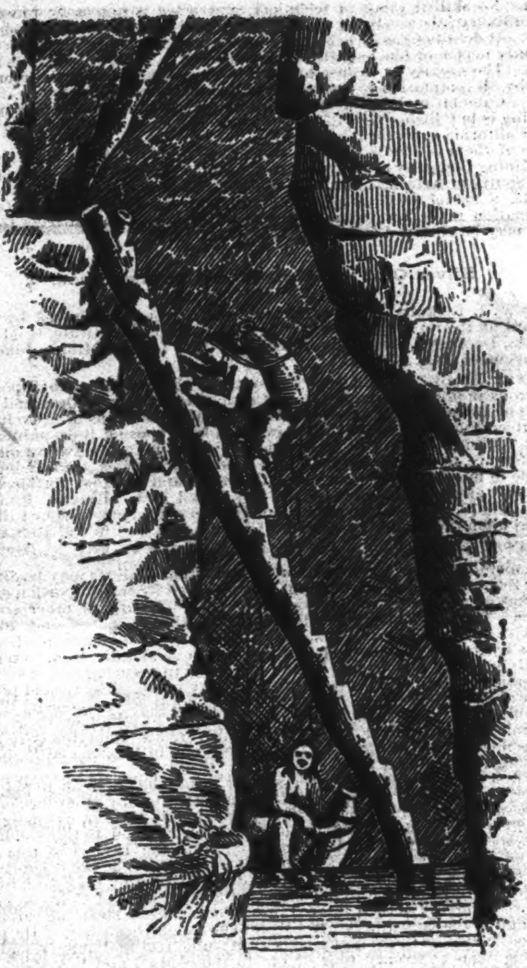
As a pleasing contrast to this state of things, it may be stated that a complete establishment for operating on twenty tons of ore per day can now be erected in the course of ninety days, at the trifling outlay of $20,000, or thereabouts, (exclusive of freight) including one of Rickard's oxydizing furnaces—costing exclusive of royalty but $1,500—capable of being built in fourteen days; and there being no complicated or expensive machinery connected with it, its construction is of the cheapest possible kind, involving very little outlay beyond bricks and labor.

The most striking advantages which it offers above all other recent inventions of this nature may be briefly summed up as follows:

1st. ITS CHEAPNESS—The cost of its erection (ex-royalty and freight) not exceeding $1,500 for a capacity to roast and chloridise twenty tons per day—viz: brick-work, $1,000; and iron-work, including blower, $500.

2nd. Short time required for erection, viz: fourteen days, after providing all materials, with a sufficiency of labor.

3rd. No expensive, heavy, or complicated machinery being necessary, involving heavy freight to the district where it may be required; brick and clay, generally obtainable on the spot, being the chief materials required in its construction.



ANCIENT MEXICAN MINING.

4th. No skilled labor or technical experience is necessary to work it, two ordinary laborers being sufficient to attend to it when in full operation.

5th. It does not easily get out of order, and is readily repaired by an ordinary mason or blacksmith when it does.

6th. The royalty or license to use it is exceedingly moderate, removing thereby all temptation to evade or infringe the patent.

7th. Calculating labor at $3 a day and wood at $6 a cord, the cost of roasting is but little over $1.50 per ton, (except when chloridized) at these high California rates for labor and fuel.

One of them is now in the course of erection by the Aztec Gold and Silver Mining Company at their mill in the Aztec District, Santa Rita Mountains, Southern Arizona. At their office, 302 Montgomery street, Rooms 14 and 15, a model may be seen; and working drawings, with all further information necessary to enable any ordinary mason to construct the furnace, may be obtained from COL. J. D. GRAHAM.

Silver Ores and their Modes of Reduction.

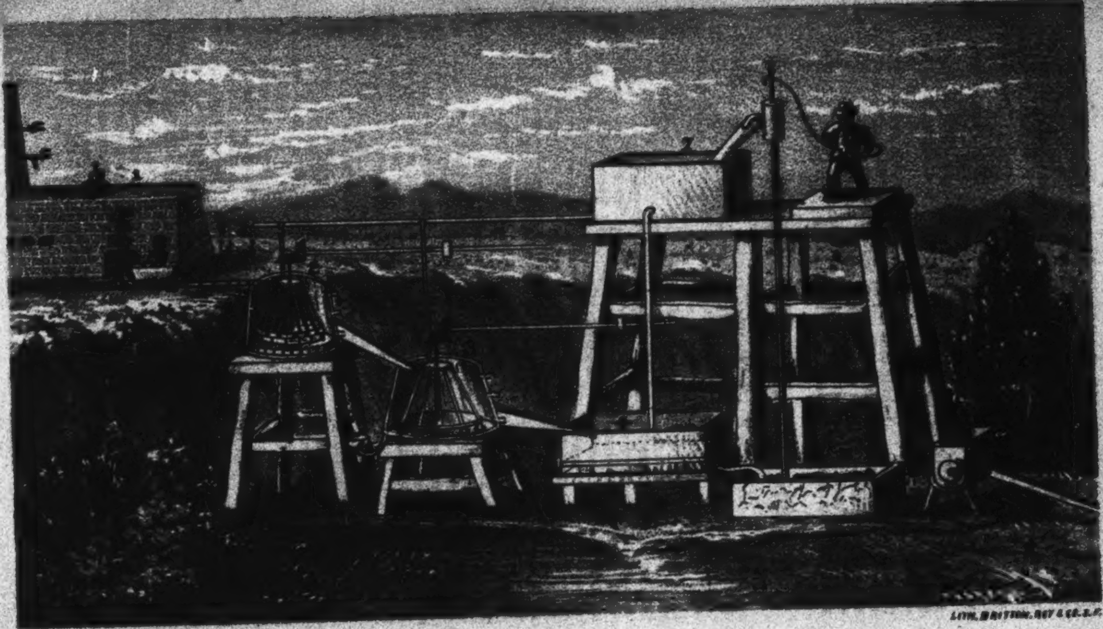
[By W. T. Rickard, F.C.S. Extract from a lecture delivered by Prof. Rickard at the rooms of the Literary and Scientific Institute, Gold Hill, Nevada, December, 1865. Reprinted from the "London Mining Journal" of November 15th, 1873.]

TO THE EDITOR OF THE MINING JOURNAL—*Sir*: Consequent upon the numerous inquiries for copies of my article upon "Silver Ores and their Modes of Reduction," I am assured that great interest has been excited on the subject; so much so that I feel justified in proposing its republication in the "Mining Journal." In this case you will perceive I have omitted all reference to historic details and chemical properties, these being procurable in most works treating upon the metal, and also that portion which relates to analysis; leaving that to my friend and colleague, Professor White, who, I perceive, has commenced a series of papers in your valuable journal upon the general treatment of metals. W. T. RICKARD.

Laboratory and Assay Office, 25 Finsbury Place, E. C., Nov. 9th, 1873.

The methods at present in use for the reduction of silver may be divided under five heads, each of which may be modified by the proportion of foreign matter present in the ore, cost of fuel or mercury, or other circumstances. The first and simplest is that of smelting the native and chloride ores with an alkaline flux, in black-lead crucibles. The rich sulphides may also be treated by this method, by the addition of metallic iron, to remove the sulphur. By this process I have succeeded in reducing rich specimens of sulphides within two per cent. of their assay value. The second process is that of amalgamating the native or chloride ores when too poor; that is, containing too much gangue or earthy matter to admit of their being economically smelted *per se*. The sulphides are also imperfectly reduced by this method, as practiced by the patio system in Mexico and Peru, and the amalgamating pans of Nevada.

The first operation in this process is to grind the ore to an impalpable powder, by means of stamps, trapiches, arastras, or any other mechanical contrivance that will insure a perfectly impalpable powder, as amalgamation will not take place until the ore has been reduced to this condition, and many serious failures have resulted from the neglect of this very essential point. If the patio system is to be adopted, the ore is spread out in the condition of a soft mud on a paved floor, called by the Spaniards the patio (or circo, when of a round shape, as at the mines of Cerro de Pasco, in Peru). Mercury is then filtered into it by means of straining through a cloth, and at the same time scattering it over the entire surface of the patio, (or circo) which at Cerro de Pasco is thirty-nine feet in diameter, and contains eighteen to twenty tons of ore to the charge, and lies about four inches thick on the floor. Salt and magistral (or sulphate of copper) are



LITH. BRITTON, REY & CO. S.F.

SILVER & COPPER LEACHING & AMALGAMATING WORKS.

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then introduced in solution, in proportion (like the mercury) regulated by the quantity of ore being operated on, and the whole incorporated by being trodden in by men or horses for six or eight hours per day, till amalgamation takes place, which is usually thirty days in summer, and often as many as ninety days in winter.

When amalgamation has been completed, which is known by the thickening of the mercury, which is examined from time to time, the contents of the circo are drawn off into large vats or settlers, where the amalgam subsides during a gentle agitation, accompanied by a stream of water which gradually carries off the tailings, or RELAVES, as they are termed by the Peruvians and Chilians. The excess of mercury is then strained through chamois leather or linen bags, and the amalgam distilled under the caparuse, (or bell) by which the mercury is collected, PER DESENTUM, in a vessel of water under the hearth. The loss of mercury by this barbarous system of distillation is only equaled by the loss in amalgamation. The aggregate loss, as admitted by Peruvian miners, is one pound of mercury to each marc of eight ounces of silver obtained by this process.

As these Peruvian ores contain much sulphide of silver, like those of the Comstock Lode, I may here describe the rationale of the process by which the unroasted sulphide of silver is reduced through the agency of sulphate of copper, salt, and mercury. The salt and sulphate of copper decompose each other, pro-chloride of copper and sulphate of soda being produced, while the metalic silver present, or reduced by electro-chemical action, decomposes the pro-chloride of copper, and, by reducing it to the condition of sub-chloride, is itself converted into the chloride of silver. The sub-chloride of copper thus formed reacts on the sulphide of silver, forming sulphide of copper and chloride of silver; the mercury, in its turn, acts on the chloride of silver, forming sub-chloride of mercury, while the liberated metallic silver combines, as an amalgam, with the excess of mercury. The indispensable condition of chloridizing the silver is thus complied with through the friendly intervention of sulphate of copper, which acts as an intermediate agent in transferring chlorine from the sodium to the silver, so as to allow the latter to amalgamate with the mercury.

The process now in operation in Nevada and other places, although conducted on the same chemical principles as that of the patio, is a gigantic move in the right direction, although much remains to be done before we can escape the reproach of throwing away thirty per cent. of our precious metals. By amalgamating in iron vessels instead of on paved floors, we have reduced the loss of mercury, and consequently amalgam, to a mere fraction (about one pound to a ton of ore operated on). By trituration with heated mercury we have reduced the time of amalgamation from sixty days to less than six hours, and the aggregate loss of silver from fifty to thirty per cent., or less.

The third method is that known as the Freiberg process, the essential characteristic of which is the roasting or calcining of the ores with salt, so as to thoroughly chlorinize the silver previous to amalgamation. The Freiberg ores usually consist of the sulphide of silver mixed with the sulphides of arsenic, antimony, iron, zinc, etc. It is important they should not contain more than five per cent. of lead or one per cent. of copper, as these metals greatly interfere with amalgamation; they amalgamate with mercury as readily as silver, and render the amalgam very tough, besides producing the effect known as the "sickening" of the mercury, which greatly diminishes its action on the silver.

The prepared ground ore is first spread on the hearth of the reverberatory furnace, and dried with incessant turning over; then the fire is raised so as to kindle the sulphur and keep the ore at a dull, red heat for two or three hours, during which time dense white-gray vapors of arsenic, antimony, and water are exhaled. The desulphurization next begins with the appearance of a blue flame; this continues for about three hours, during which time the ignition is kept up and the mass diligently turned over, in order to present new surfaces, and also to prevent any caking. As soon as the vapors of sulphurous acid cease to be formed, the finishing calcination is to be commenced with increased firing—the object being now to decompose the salt, (usually introduced into the furnace at this stage of the process) by metallic sulphates that have been generated by the previous roasting, and to convert them into chlorides, with the simultaneous production of sulphate of soda. The stirring is to be continued till the proofs taken from the hearth no longer betray the smell of sulphurous, but only hydrochloric acid gas.

The last roasting stage commonly lasts about three-quarters of an hour. During the last roasting the ore increases in bulk by about one-fourth, and becomes of a brown color. When this process is completed the ore is raked out on the stone pavement and allowed to cool, then screened in close sieve boxes, in order to separate the finer powder from the lumps formed by coagulation during the roasting; these are to be bruised, mixed with salt, and subjected to another calcination; the fine powder is then subjected to the pulverizing action of millstones, or other suitable apparatus, and brought to the condition of an impalpable powder, when it is ready for the amalgamating process.

This is performed in casks, arranged in a horizontal position in rows, each turning on a shaft which passes through its axis. These casks are of various sizes, from a capacity to receive 1000 pounds of ore to that of 8000 pounds, and are provided in most cases with iron ends. When charged with the sifted ore and about 30 per cent. of water, about 8 per cent. of metallic iron is introduced for the purpose of reducing the chloride to the condition of metallic silver, when it amalgamates with the mercury. The casks, being charged, are set to revolve for one and one-half or two hours, till the ore-powder and water become a uniform pulp. The mercury is then introduced, and the casks again put in motion, at the rate of about twenty revolutions per minute, for fourteen or sixteen hours.

During the rotation the temperature rises considerably, so that even in winter it sometimes stands as high as 104 deg. Fahrenheit.

In this operation, the chloride of silver is decomposed by the metallic iron, and the liberated silver amalgamated by the mercury. This matter is greatly facilitated and expedited by the presence of an excess of salt in the water, which, although taking no direct chemical action on the already chlorinized silver, increases the intensity of the reducing power of the iron, by its predisposing or electro-chemical agency, just as in the voltaic pile copper and silver are rendered active by a solution of salt. This fact is well known and appreciated by the amalgamators of Chili, who always use salt in the reduction of their ores of native and chloride of silver with advantage, both as regards time and produce. As soon as the amalgamation is supposed to be complete, the casks are filled with water, and set to revolving slowly, (about six or eight times in a minute) whereby, in the course of an hour, the greater portion of the amalgam will have collected at the bottom, and, in consequence of the dilution, a portion of the chloride of silver held in solution by the salt will fall down and become decomposed and amalgamated. The amalgam is then drawn off into suitable vessels, and the remaining portion of the casks run off into a vessel similar to the separators of Nevada, where the remaining portion of the amalgam is recovered. The amalgam is then strained and distilled in the usual manner, previous to the melting of the silver into bars.

The fourth process, which is very extensively practiced in England, is that of smelting the refractory ores of silver with argentiferous galena. In this operation, the lead ore is first crushed and concentrated by washing up to 60 or 70 per cent. of lead; it is then dried on the top of the reverberatory furnace, which, in its most improved form, is furnished with two hearths, one above the other. The dried ore is passed through a door in the roof of the upper hearth, where it undergoes a roasting and desulphurizing process at a temperature sufficiently low to avoid fusing the sulphide of lead. When this has been accomplished it is raked through an aperture into the hearth below, where it is kept some hours at a red heat. It comes out in a vitrified condition, and contains about 90 per cent. of lead. The roasted ore is then broken up and mixed with limestone and small coal, metallic iron, and sometimes soda ash—the mixture thrown into the reducing furnace, (which is on the cupola principle, similar to those used in the iron foundries) with alternate layers of coal. When the operation is completed, the slags are nearly free from lead and silver, and a mat remains with the last portion, which contains about 20 per cent. of lead; this is broken up and returned to the furnace with the next charge. The poor and refractory ores of silver, such as tailings, are very advantageously treated by this process; they are first to be mixed with sufficient clay to give consistency to the mass, to enable it to be moulded into small bricks; these are dried in the air till they will bear handling, and then introduced into the reducing furnace when at its full heat. The silver is taken up by the lead with all the accuracy of an ordinary assay, and is afterwards separated by what is known as Pattinson's process for desilvering lead. This operation is performed in twelve to twenty-four cast-iron pans, five to three feet in diameter, and from three to three and one-half feet deep, set in two rows, back to back in a range of brick-work, each pan being furnished with its own furnace. The argentiferous lead is introduced into the pans at each extremity of the range, and when melted, the fire is drawn, and contents permitted to cool; as it does so the lead solidifies as small granular crystals from the sides towards the center. When about one-half the quantity has solidified it is quickly fished out with large iron ladles, (perforated so as to allow the fluid portion of the lead, which retains the silver, to flow back into the pan) and transferred to the next pan, where it undergoes the same process of melting, cooling, and fishing into the next pan, and so on till the solid fished lead is found to be free from silver, which is generally accomplished by the time it has reached the sixth pan, all the silver remaining with the fluid lead left in the different pans.

Fresh silver-lead is introduced into the first pan after each fishing, and the silver is thus concentrated in the fluid lead of each pan, without increasing its bulk. This concentration goes on until it approaches 180 ozs. of silver to the ton of lead, the concluding operations having been performed by mixing the different fluid portions, and gradually concentrating, by repeated fishings, in one small pan. When the richness has arrived at 180 ozs. to the ton, (which it should not be allowed to exceed) it is conveyed into a small pan set in the same brick-work with the cupelling furnace, and fed into the cupel by a ladle, through a channel of communication, as required. The cupel is usually of an oval shape, two feet long by fifteen inches wide, and three inches thick. It works off its charge to saturation, and furnishes the plate of silver in about twenty hours. By this process lead containing but six ounces of silver to the ton is profitably worked. The loss of lead does not exceed two per cent., while its quality (*i. e.*, malleability) is greatly improved by extracting the silver, desilverized lead being worth $5 per ton more than that which contains silver enough to contaminate, but not enough to pay for extraction.

When silver is found to exist in paying quantities in copper ores, which is often the case with the gray or antimonial ore of copper, the calcined ore is mixed with lead, or lead ores, and fused or calcined, and the resulting products are either liquated, to sweat out the silver, or cupelled. In liquation, the copper is turned into pigs, (called liquation cakes) and kept above a red-heat for two or three days; the lead first smelts, and flows into cast-iron troughs, carrying with it the silver, which is afterward obtained by cupellation.

The fifth and last method of reduction is that known as the brine process, by which the chloride of silver formed by calcining and chlorinizing in the reverberatory furnace is dissolved out of the other furnace products by means of a hot concentration of salt, and the metallic silver obtained by precipitation with metallic copper.

This process was first introduced in Germany some years ago, but from some defects and obstacles in working it on a large scale it was for a long time regarded by practical men as a failure, until, after a series of elaborate and expensive experiments, said to have cost over $200,000, it was brought to perfection, and is now in successful operation in the copper smelting works of Vivian & Co., Swansea, where it is applied to the extraction of silver from copper ores with which refractory ores are mixed, and is conducted simultaneously with the reduction of the copper. The ore is first ground and calcined in the usual manner in large furnaces, holding three and a half tons at a charge. It is then transferred to another reverberatory furnace, where it is smelted into a regulus, removing the slag as it is formed on the surface from time to time. As soon as the regulus shows bubbles over the surface, the fusion is considered complete, and the charge run off into water, in order to obtain it in the granulated condition. The furnaces for this part of the process receive from one to one and a half tons at each charge. The granulated regulus is then ground to a fine powder, and introduced into a calcining furnace, holding about 600 lbs. at a charge, and a very gentle heat applied at first, (as it partially burns of itself) say for five hours, when the temperature is to be raised as high as can be maintained (without melting) for six hours more, making eleven hours in all for this desulphurizing and oxydizing operation. When taken from the furnace it is ground and sifted to an impalpable powder, and then thrown into another calcining furnace; and after being heated up for about an hour, twenty-five lbs. of salt are added, and the heat continued, with constant stirring, for about three-quarters of an hour more, when it is removed from the furnace, and conveyed, when cold, to tubs of about five feet in diameter and fifty-six inches deep, furnished with perforated false bottoms, covered with canvas, (well caulked around the sides) on which is placed a strainer of wicker-work. On this are thrown 800 lbs. of the stuff as it comes from the chlorinizing furnaces, and upon it is poured a hot and nearly saturated solution of salt. The temperature should not be lower than 170 deg. Fahr., nor the strength below 43 deg. of Twaddle's hydrometer. This is allowed to rest awhile, and the liquor filtered off into another similar tub, but containing waste copper clippings, or filings, about three inches deep. Here the metallic silver is precipitated by the copper, after which the solution, containing copper which has replaced the silver, is drawn off into a third or fourth tub, containing iron clippings, in which the copper, in its turn, is recovered, by precipitation on the surface of the metallic iron.

The fine crystalline metallic silver is then separated from the copper by agitation and washing, and at once melted into bars.

The precipitated copper is treated in the same manner, while the furnace products, deprived of their silver in the first tub, are taken to the reducing furnace, where the metallic copper is melted out and refined in the usual manner.

It may not be inappropriate to state that for several years I have been engaged with the details of an oxydizing and chloridizing furnace, so constructed as to surpass, in its capacity for oxydizing and chloridizing ores, all furnaces as yet brought into use. The main principle is the introduction of sufficient oxygen in a heated state, combined with an automatic feed of pulverized ore, insuring the most thorough, regular, and rapid oxydisation, at the minimum of cost in furnace, labor, and fuel.

[The oxydizing and chloridizing furnace described in the preceding pages of this pamphlet, is the result of the study and experiments above alluded to.—W. T. R.]

In comparing the Nevada system of working with these various processes it will be seen to consist of an adaptation of the Mexican or Peruvian methods with the Freiberg system, whereby the unroasted sulphides are rapidly though imperfectly reduced during the process of final pulverization in iron pans, through the intervention of sulphate of copper and salt. Very little can be said in favor of the other chemical substances employed, many of them being totally inactive, and some of them positively injurious.

Sulphuric acid in some cases appears to act beneficially, in generating hydro-chloric acid, which dissolves the iron scales formed in the pans and floating on the surface of the mercury, which prevents contact and amalgamation with the silver of the ore. The value of sodium in amalgamation still remains to be proved on the working scale, although the results in the laboratory of Mr. Crooks (the discoverer of its peculiar properties) are said to be very remarkable.

The mechanical part of the operation appears to have arrived at the highest degree of perfection, by means of improved stamps for coarse grinding, and the various and excellent pans in use for final pulverization, each being judiciously adapted to the work it is best calculated to perform in the most economical manner.

Although during the last few years many very ingenious plans for crushing have been introduced, the old Cornish stamps still carry off the palm for rapid and cheap coarse grinding. They have been superseded by the Wheeler pan and other similar contrivances for impalpable pulverization, while the two together form probably the most perfect quartz mill that can be constructed.

It is to improved methods of amalgamation and leaching that we must look for the means of reducing the heavy loss of silver now being sustained in working the Comstock ores, and other silver ores; and already considerable progress has been made in that direction by the result of experiments. Such methods of operation as that described in connection with the Rickard oxydizing furnace, which contributes, perhaps, more than any other branch of the process to the successful results obtained, by the thorough, expeditious, and cheap manner in which it prepares the ore for subsequent treatment—are now found to be the long-sought desideratum

Railroad Lands and their Terms.

The Southern Pacific Railroad of California, who are pushing their way eastward from Yuma, through Arizona, and over whose line the great body of travel must, for some time to come, pass into that territory, have for sale in Southern California a large amount of lands, under patent direct from the Federal Government, which are presented on favorable terms.

The Company invites settlers to go on the lands, and intends to sell to them in preference to any other applicants, and at prices based upon the value of the land without the improvemements put upon it by the settlers. It makes no definite contract with any individual upon this basis, but it treats all fairly. Any person desiring to settle upon vacant railroad land, after survey and before it is patented, should address a letter to the Company's land agent. This will be sent at once. It is their policy to encourage the settlement of its lands in small tracts, by persons who will live on and cultivate them. No deed is made until the entire price is paid. All sales are made for gold coin, which may be paid in person, or sent by express, or by a banker's check on a bank in San Francisco. The Company does not deal in exchange, or take any risk of loss in transmission.

The lands are not uniform in price, but are offered at various figures from $2.50 upwards per acre; usually, land covered with tall timber is held at $5 per acre, and that with pine at $10. Most is for sale at from $2.50 to $5. Special inquiry must be made as to each piece. The purchaser must pay for the acknowledgment of the three signatures to the deed—the law now allows one dollar for each signature—and he must pay for recording, usually about $2.50 for each deed. Land is sold on contract, allowing time for payment of a part of the purchase money—if the tract be eighty acres or more, and if it have no timber. If it be less than eighty acres, or if it be covered with timber, no sale will be made except upon full payment of cash before the execution of any paper. The rule of the Company is to make no contracts for sale of land before the patent for it has been received. All contracts for the sale of land on time are made in uniform manner. The terms are the same in every case. The purchaser must pay one-fifth of the price, and also interest for one year on the balance, before he can get a contract; he must then pay the interest in advance at the beginning of each subsequent year, till the fifth year is up, and then pay his principal and take his deed. As stated, payment in full of the purchase money can be made at any time; but after interest has been paid, no part of it will be refunded. No longer credit than five years will be allowed in any case.

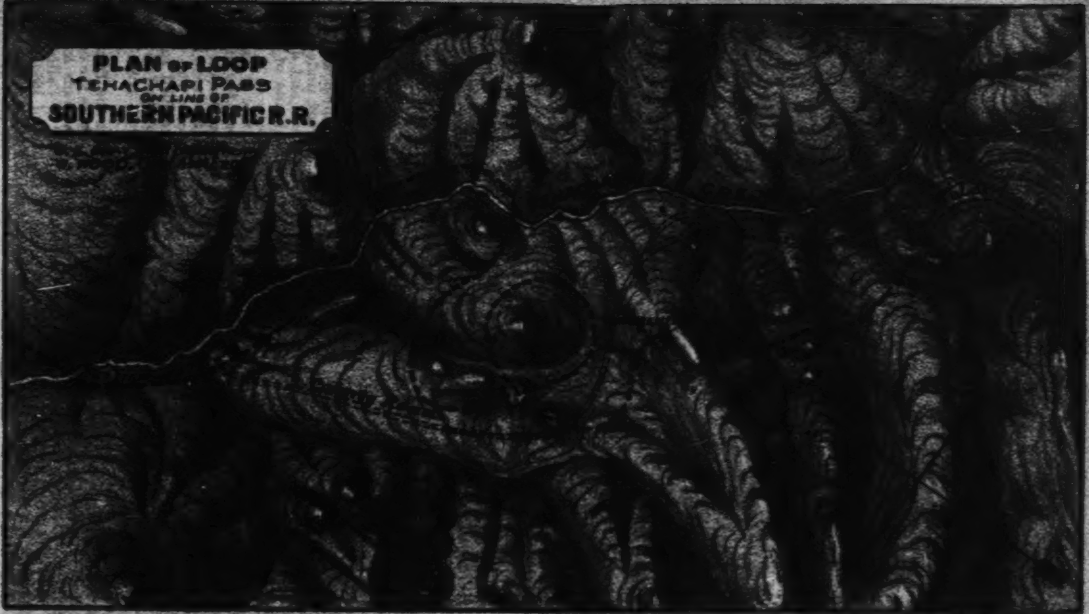
The lands given to the Southern Pacific Railroad Company by Congress extend from San José, by way of Gilroy, Hollister, San Benito Pass, Los Gatos, Goshen, Tehachapi Pass, Los Angeles and San Gorgonio Pass, to Fort Yuma, and also from Tehachapi Pass eastward to the Needles on the Colorado River.

These lands include many valuable mineral deposits. Coal oil is abundant in Los Angeles and Ventura Counties, and large quantities are shipped to the San Francisco market, after the home demand has been supplied. Deep and extensive beds of borax, soda and salt are found on the Mojave Plains. Asphaltum springs are numerous from Santa Cruz to Los Angeles. Gypsum is found at many places, and the finest alabaster in Los Angeles County. Granite, sandstone and marble, suitable for building; soapstone, sulphur, and medicinal springs; gold, silver, quicksilver, copper, lead and antimony are also among the prominent mineral features of the region between San José and Fort Yuma; and all the minerals, save the metals mentioned in this section, go with the land. The first act of Congress giving land to the Southern Pacific Railroad Company of California, was passed on the 27th of July, 1866, and provided for the construction of a railroad across the continent on the thirty-fifth parallel of latitude, by the Atlantic and Pacific Railroad Company. It gave to the Company a right of way of two hundred feet wide, and the land grant is thus expressed:

"That there be and hereby is granted * * every alternate section of public land not mineral, designated by odd numbers, to the amount of twenty alternate sections per mile, on each side of said railroad line, as said Company may adopt through the Territories of the United States; and ten alternate sections of land per mile on each side of said railroad whenever it passes through any State, and whenever on the line thereof the United States have full title, not reserved, sold, granted, or otherwise appropriated, and free from pre-emption, or other claims of rights, at the time the line of said road is designated by a plat thereof filed in the office of the Commissioner of the General Land Office; and whenever prior to said time any of said sections shall have been granted, sold, reserved, occupied by homestead settlers, or pre-empted or otherwise disposed of, other lands shall be selected by said Company in lieu thereof, under the direction of the Secretary of the Interior, in alternate sections, and designated by odd numbers, not more than ten miles beyond the limits of said alternate sections, and not including the reserved numbers."

Those were, by Sec. 3, the terms of the grant to the Atlantic & Pacific Railroad Company for a railroad across the continent on or near the thirty-fifth parallel. Sec. 18 gave the same amount of land, ten sections on each side of the road per mile, to the Southern Pacific Company, for a road from the Colorado, near the thirty-fifth parallel, to San Francisco. The plat, authoritatively fixing the line of the road under this act, was filed in the office of the Secretary of the Interior, on the 3rd January, 1867, and on that day the legal title of the Southern Pacific Company attached from San José to the Needles.

On the 3rd of March, 1871, Congress passed an act giving to the Texas & Pacific R. R. Co. a franchise and land grant for a railroad across the continent on or near the thirty-second parallel, and Sec. 23 of the Texas & Pacific Act authorizes the Southern Pacific Railroad Company of California to build a branch upon the same terms as those of the Act of 1866, from Tehachapi Pass, by way of Los Angeles, to the Texas & Pacific road at or



PLAN OF LOOP
TEHACHAPI PASS
ON LINE OF
SOUTHERN PACIFIC R.R.

[illegible]

[illegible]

near the Colorado River. The Southern Pacific Company filed its plat under this act on the 3rd April, 1871.

The following are some of the advantages of Southern California as a home for the immigrant: It has a large area as compared with the population; there are only two inhabitants on the average to the square mile, and if we count only the fertile land, there are not more than six; whereas several European countries, with a soil not richer by nature, have one hundred to the square mile. Sparseness of population is an advantage, in so far as it implies a rapid increase; for it has always been observed that the immigrants will seek those districts where there is most room for them, and where, consequently, land is cheapest. The population of Massachusetts increases very slowly, because Illinois has fewer people to the square mile; and the latter State having more inhabitants, does not gain so fast as California. It is the proportion of increase that gives activity to business and profit to the ownership of land. Such a region is Southern California. Illinois, which is one of the most prosperous and progressive States east of the Mississippi, has been gaining about four per cent. annually for the last ten years; Southern California has been gaining at least ten per cent., or more than twice as much. This rapidity of increase is a great attraction for settlement, and an excellent assurance of prosperity of the settlers.

It has only recently become accessible by rail. The cars made their first through trip from San Francisco to Los Angeles on the 5th of September, 1876; and before June, 1876, the trains from the former city did not go farther than Caliente, beyond which point they are now (December 1st, 1877) in operation to Yuma City, Arizona, a distance of 720 miles from San Francisco. The newness of these roads is proof that their attractive power upon immigration is still strong, and that the country must have business for many thousands of additional settlers, even if no more roads were to be built.

But other local railroads will soon be added, including, it is to be hoped, 160 miles from Soledad, in the Salinas valley, to a junction at or near Bakersfield; 60 miles from Anaheim to San Diego; a road to Santa Barbara, and a road to Central Arizona.

The construction of a railroad across the continent, near the Mexican boundary, at no distant time may be considered a certainty. The Southern States demand it as necessary to their prosperity, and they have so much political influence that Congress cannot refuse. A land grant of 25,600 acres per mile through Arizona and New Mexico has already been given, and the Southern Pacific Company offers to build the road across those territories if that land be transferred to it. The country on the thirty-second parallel is 600 miles away from the Central Union Pacific line, and offers the best route for another iron track connecting the two oceans. The distance from Fort Yuma to the nearest railroad in Texas is less than 1,000 miles, a gap too short to be left unoccupied. Such a road will greatly develope Arizona, as well as accelerate the prosperity of Southern California.

It does not require a long examination of the map and condition of Mexico, to arrive at the conclusion that there must be a railroad from Mazatlan in latitude twenty-three degrees to Yuma; and that this road, leading through Los Angeles and Sacramento to Puget Sound, must be one of the most important channels of travel and trade on the continent. The high table land occupying the middle of the continent in Mexico presents great topographical obstacles to railroad construction, and besides has only a scanty population and scanty resources as compared with the plains; and it may be set down as certain that the main road connecting the southern part of Mexico with the United States must run near the coast on each side, one striking the Rio Grande, near Matamoras, and the other reaching the Colorado, at Yuma. The 9,000,000 present and 30,000,000 prospective inhabitants of Mexico will do much to enrich Southern California, where they will find a pleasure resort more to their taste than any where else in the New World.

[illegible] Colorado River. The Southern Pacific Company filed its plat [illegible] on the 3d April, [illegible].

[illegible] Southern California as a [illegible] the [illegible] the acre [illegible] than [illegible] the [illegible] of Massachu-[illegible] the square [illegible] so that [illegible] to mul-[illegible] Southern Cali-[illegible] and prosperous [illegible] per cent. annu-[illegible] been gaining at least [illegible] of business is a [illegible] prosperity of [illegible]

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CALIFORNIA and ARIZONA

STAGE COMPANY,

ESTABLISHED, 1866.

Carrying United States Mail and Wells, Fargo & Co's Express.

On and after August 2nd, 1877, stages on this line will leave Prescott every other day, (even days in August and odd days in September) for

Wickenburg, Ehrenberg, Dos Palmas, (S. P. Railroad)

AND ALL POINTS IN CALIFORNIA.

Connecting at Wickenburg with our line of Stages for

PHŒNIX AND FLORENCE.

Connecting at Florence with the Southern Pacific Mail Line for Tucson and all points in

SOUTHERN ARIZONA AND NEW MEXICO.

With comfortable coaches and good stock, the trip is made in the pleasantest possible manner.

THROUGH TICKETS TO

Colton, Los Angeles, San Francisco and Sacramento,

Can be had by applying at any of the Company's offices in the Territory.

☞ Fare Cheaper and Time Quicker than by any other route.

JAMES STEWART,
Gen. Supt., San Bernardino, Cal.

J. H. PIERSON, Sec'y, Wickenburg. J. H. HUGHES, Agent, Prescott.

A

SOUTHERN PACIFIC MAIL STAGE LINE.

Carrying Mails and Wells, Fargo & Co's Express 125 miles per day, schedule time, with 4 and 6 horse

CONCORD COACHES,

To the New Silver Mines of Arizona,

FROM SAN FRANCISCO, VIA THE

SOUTHERN (CAL.) PACIFIC RAILROAD,

To **YUMA,** on the Colorado River, 720 miles. Children between 5 and 12 years of Age, Half Fare.

FORTY (40) POUNDS OF BAGGAGE CARRIED FREE

BY THE STAGE.

Extra Baggage Ten (10) Cents per pound per one hundred miles.

First-Class Passengers leave San Francisco 4 P. M. Daily,

ARRIVE YUMA SECOND MORNING.

Third-Class Passengers leave San Francisco 4½ P.M. Daily,

ARRIVE YUMA THIRD MORNING.

BRANCH LINE STAGE CONNECTIONS:

			Currency.
At PHŒNIX	for WICKENBURG,	Fare from Phœnix,	$10.00
" "	" PRESCOTT,	" "	22.00
At FLORENCE	" GLOBE DISTRICT,	" Florence,	10.00
" "	" SILVER KING DISTRICT,	" "	5.00
At TUCSON	" ALTAR,	" Tucson,	10.00
" "	" HERMOSILLO,	" "	20.00
" "	" GUAYMAS, { From S. F., 6 days, twenty by steamer. }	" "	30.00

KERENS & MITCHELL, PROPRIETORS,

Principal Office, Yuma, A. T.

W. M. GRIFFITH, *General Sup't.*

GEO. H. BOWER, *Agent.*

		Miles	Total	Through Time from San Francisco.	Unlimited First Class.	Limited Third Class.
From Yuma to Gila City	A. T.		22	2nd day... 1 P. M.	48 75	37 75
" Gila City to Stanwix	"	74	96	3rd " ... 9 A. M.	65 00	54 00
" Stanwix to Gila Bend	"	52	148	3rd " ... 7 P. M.	75 00	64 00
" Gila Bend to Maricopa Wells	"	43	191	4th " ... 5 A. M.	85 00	74 00
" Maricopa Wells to Phœnix	"	30	221	4th " ...10 A. M.	93 00	82 00
" Maricopa Wells to Florence	"	46	237	4th " ... 3 P. M.	88 50	77 50
" Maricopa Wells to Camp McDowell	"	60	251	4th " ... 5 P. M.	98 00	87 00
" Maricopa Wells to Tucson	"	109	300	5th " ... 6 A. M.	100 00	89 00
" Tucson to Camp Grant	"	100	400	6th " ... 6 A. M.	115 00	104 00
" Tucson to Camp Bowie	"	125	425	6th " ...11 A. M.	115 00	104 00
" Camp Bowie to Silver City	N. M.	100	525	7th " ...11 A. M.	130 00	119 00
" Silver City to Mesilla	"	120	645	7th " ...12 M.	140 00	129 00
" Mesilla* to Las Cruces	"	4	649	8th " ... 1 P. M.	144 00	133 00
" Mesilla to El Paso	Texas.	50	699	9th " ... 1 A. M.	149 50	138 50
" El Paso to Fort Davis	"	235	934	11th " ....Midnight	183 00	172 00
" Fort Davis to Fort Stockton	"	65	999	12th " ... 1 A. M.	192 00	181 00
" Fort Stockton to Fort Coucho	"	175	1 124	13th " ... 2 A. M.	216 00	205 00
" Fort Coucho to Fort Worth †	"	225	1 349	14th " ...11 A. M.	240 00	229 00
" Fort Coucho to Fort San Antonio	"	225	1 349	14th " ...11 A. M.	240 00	229 00
" Fort Coucho to Fort Austin	"	225	1 349	14th " ...11 A. M.	240 00	229 00

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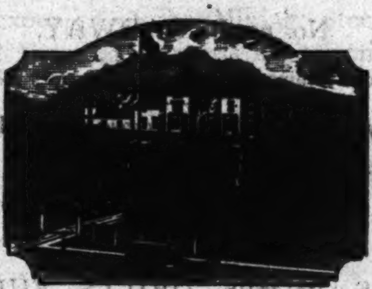

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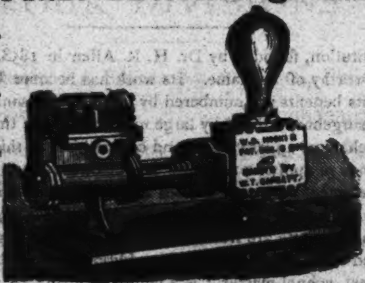

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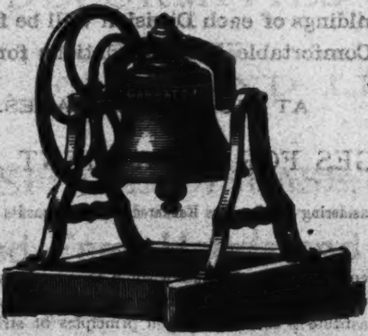

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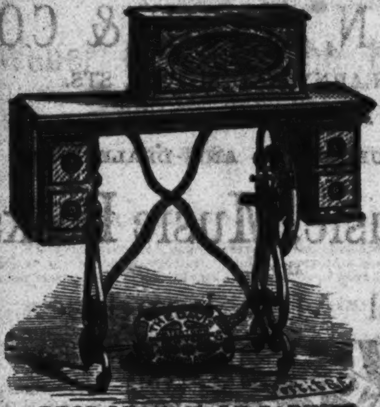

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